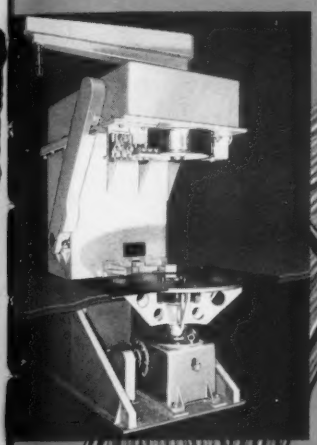
WIRE AND WIRE PRODUCTS

FEBRUARY, 1960



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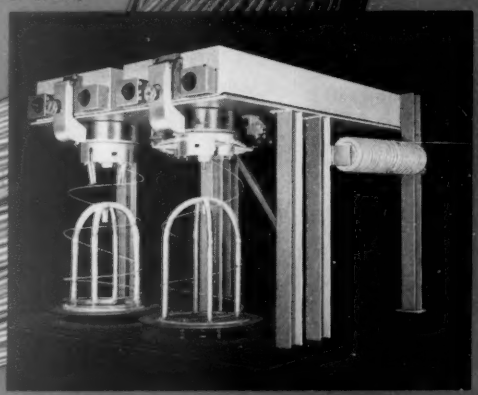

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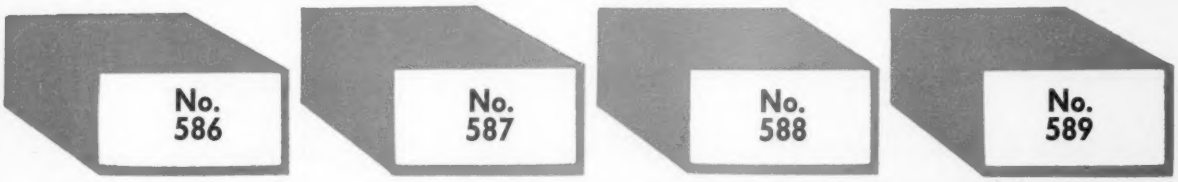

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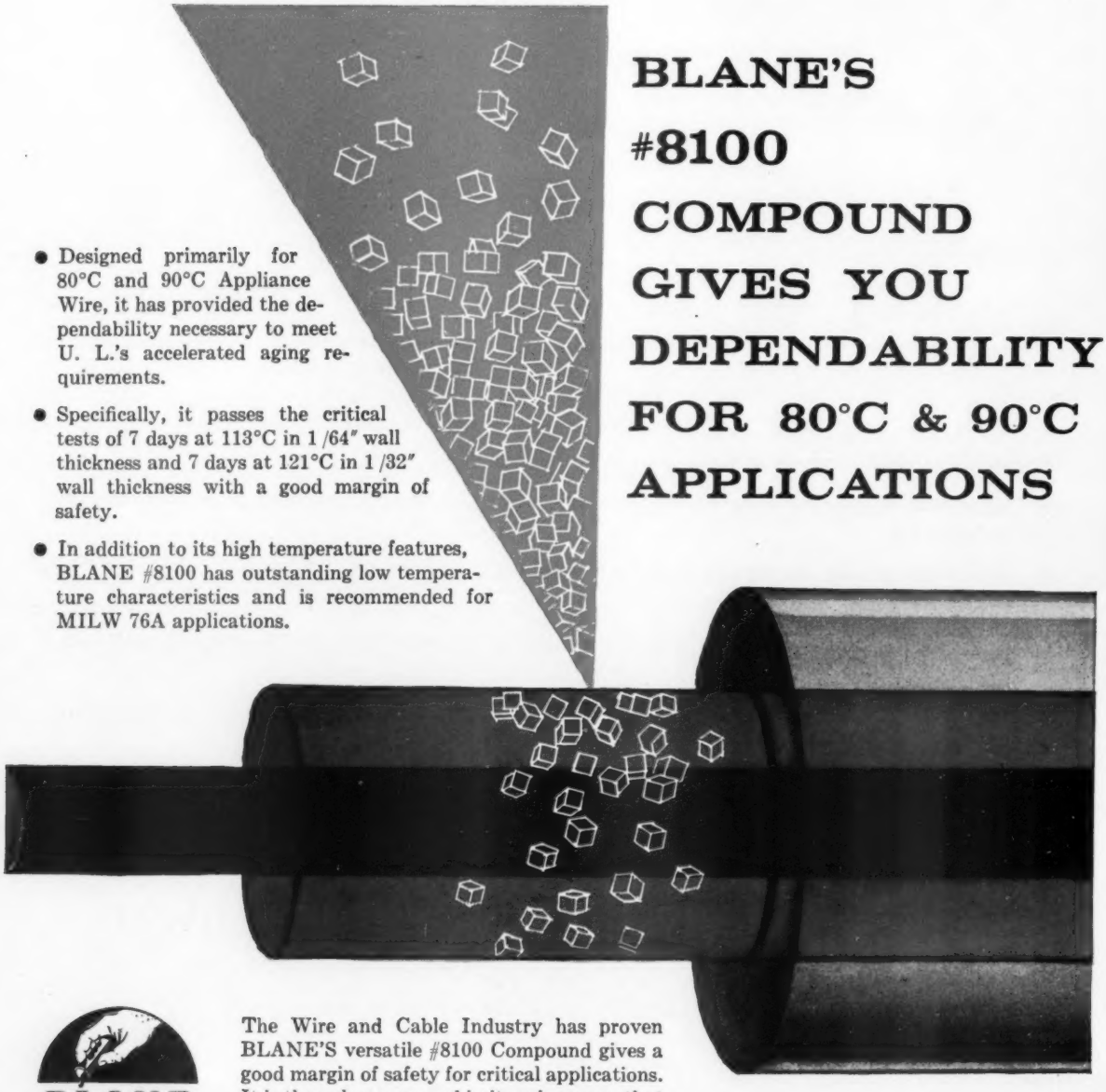

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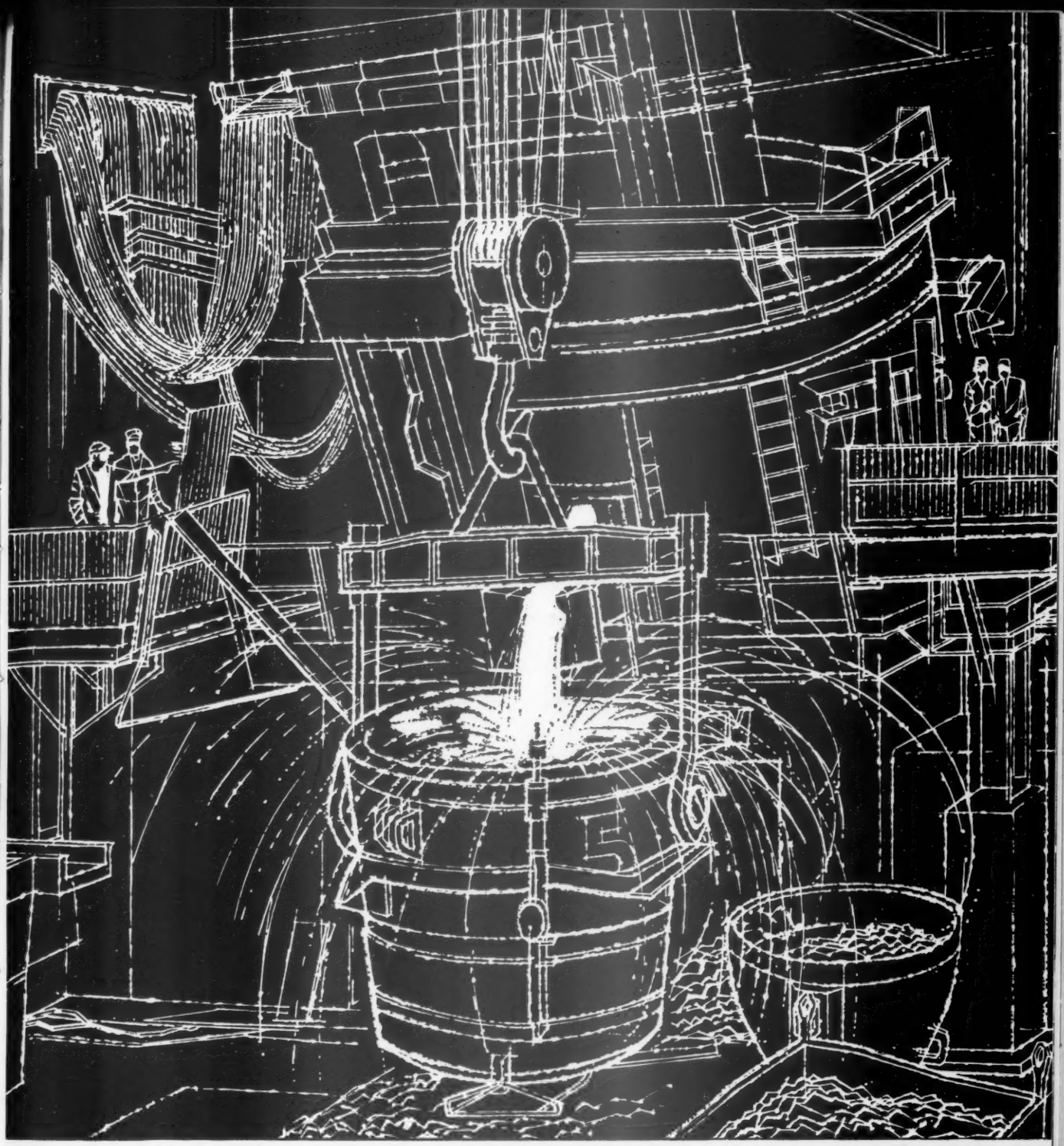

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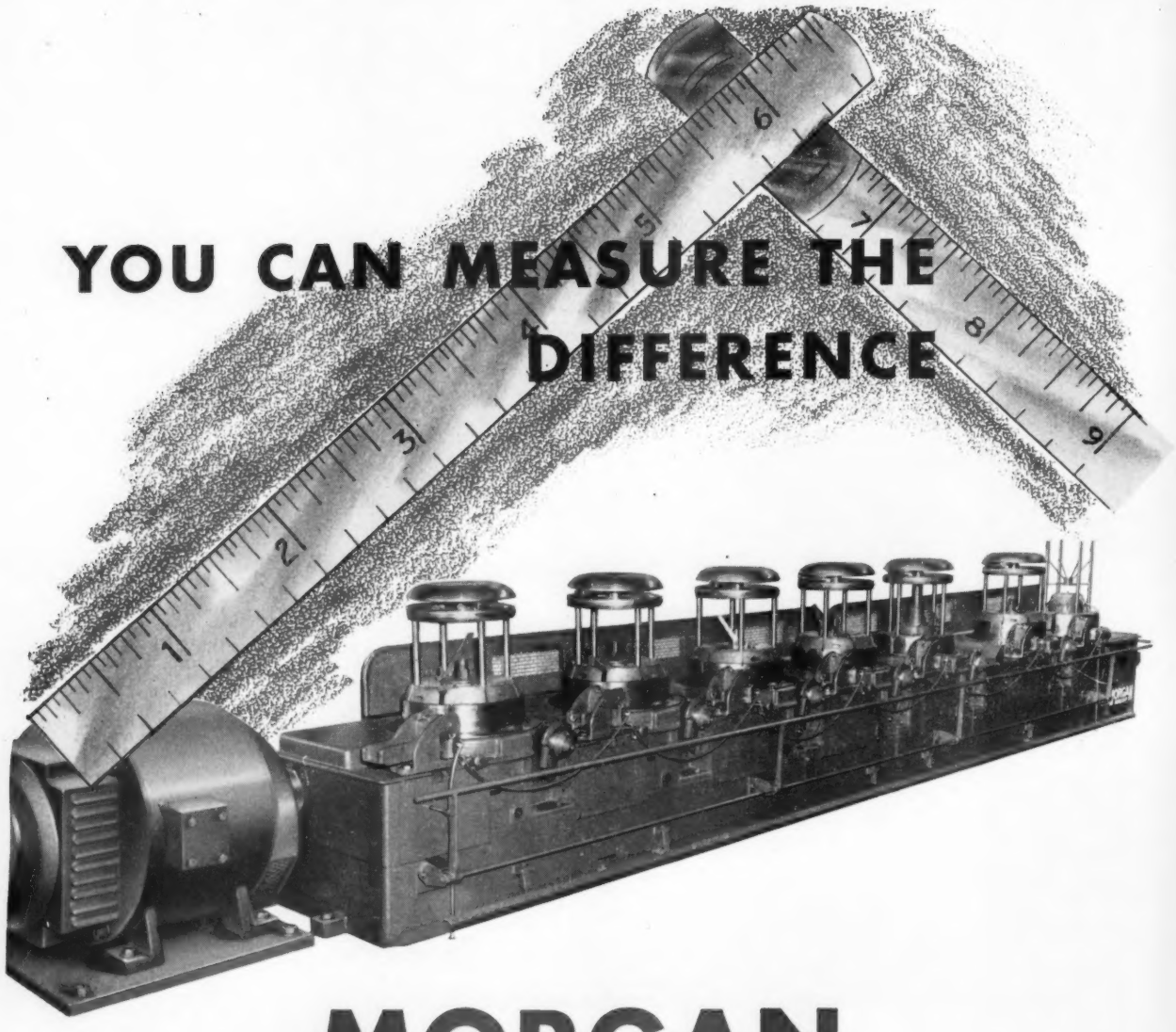

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 35 February, 1960 No. 2

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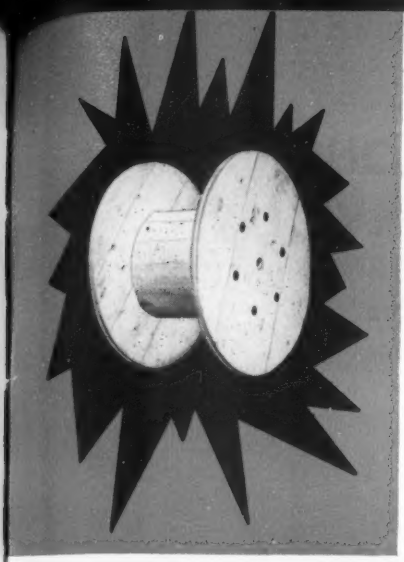

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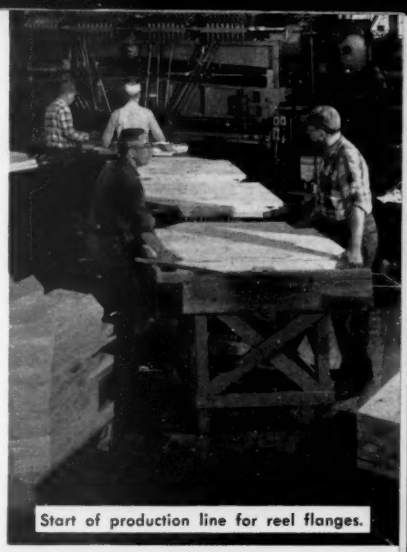

Start of production line for reel flanges.

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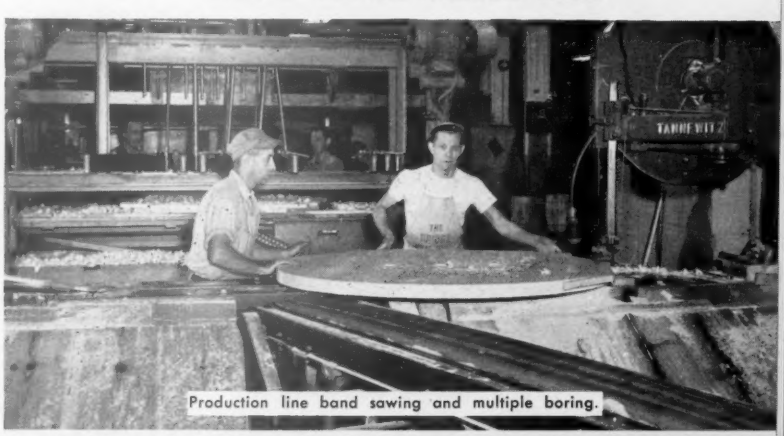
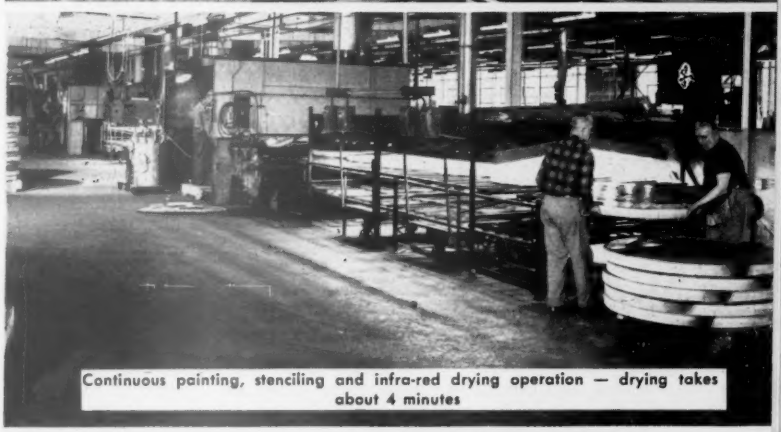
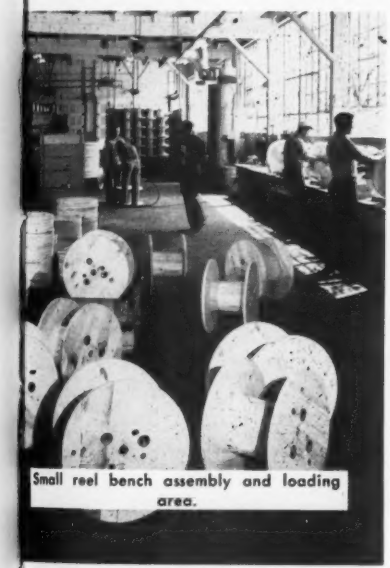


Production line band sawing and multiple boring.



Continuous painting, stenciling and infra-red drying operation — drying takes about 4 minutes



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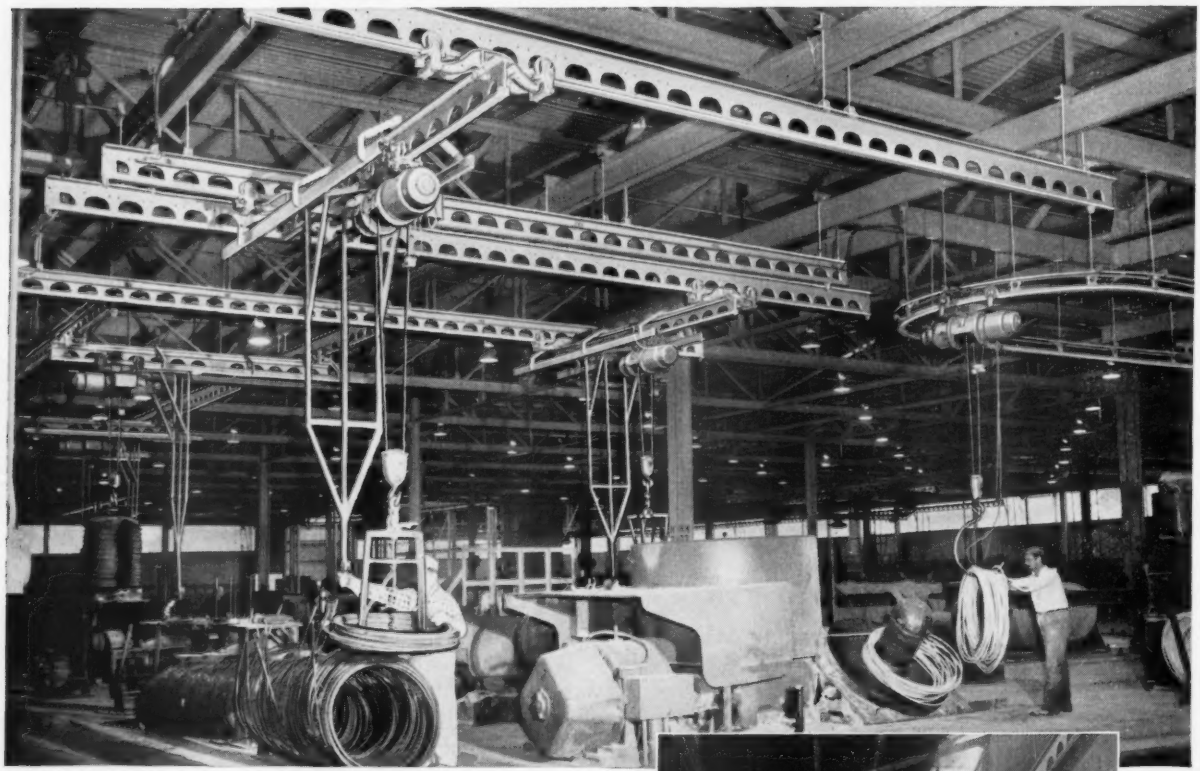
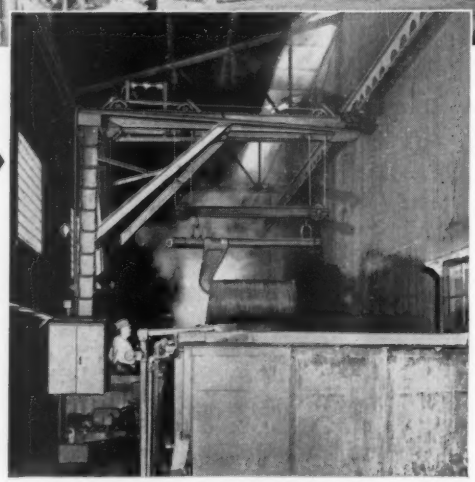


Cleveland Tramrail is easy to install and use. Much of the equipment has been especially designed for wire and rod handling service.



Cleaning house gantry crane. This is one of many Cleveland Tramrail developments that have brought important advantages to the wire and rod industry.

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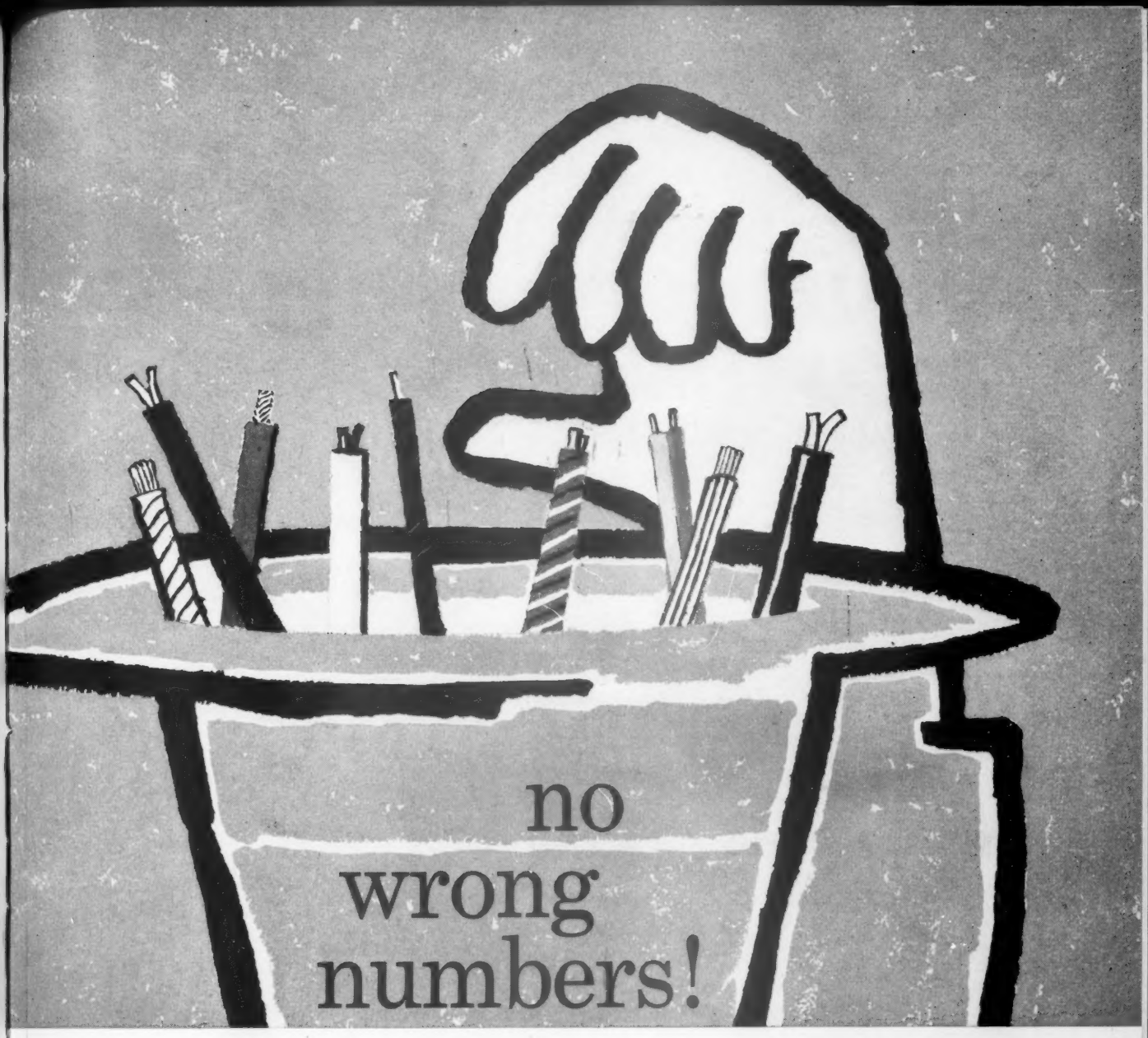

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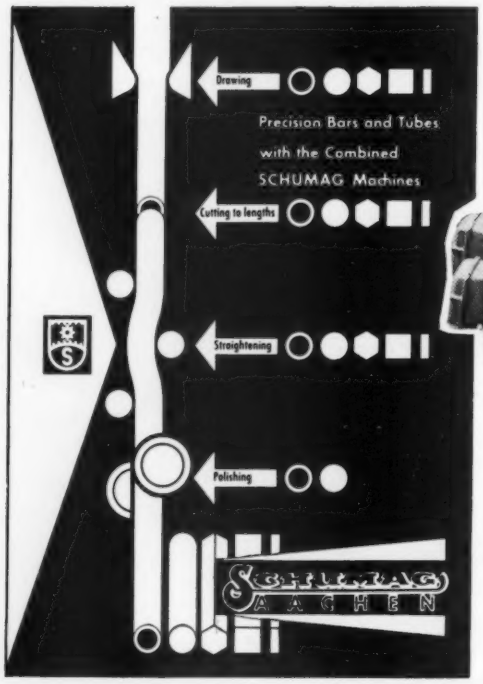

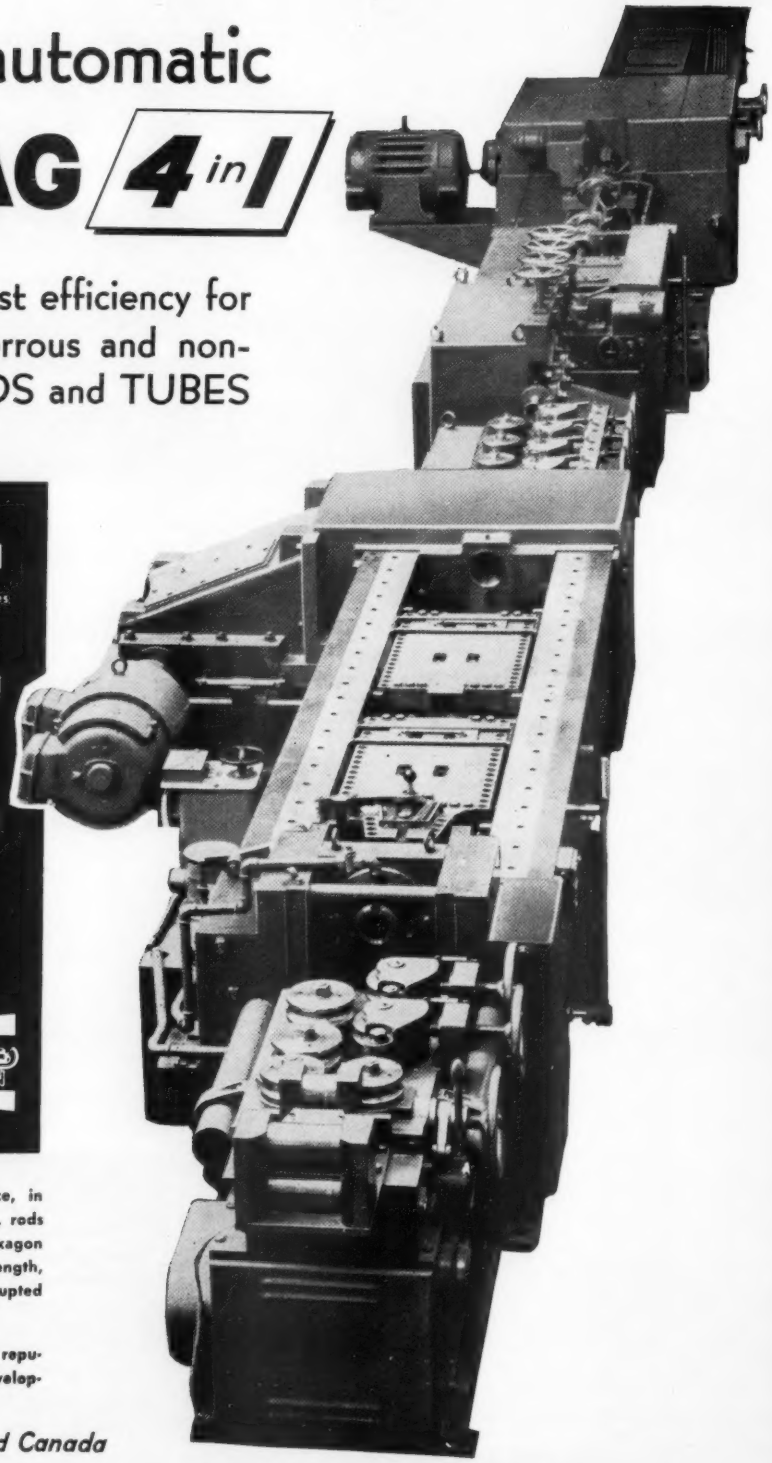

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PX-212 n-Octyl, n-Decyl Adipate
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automatic butt welders for welding steel

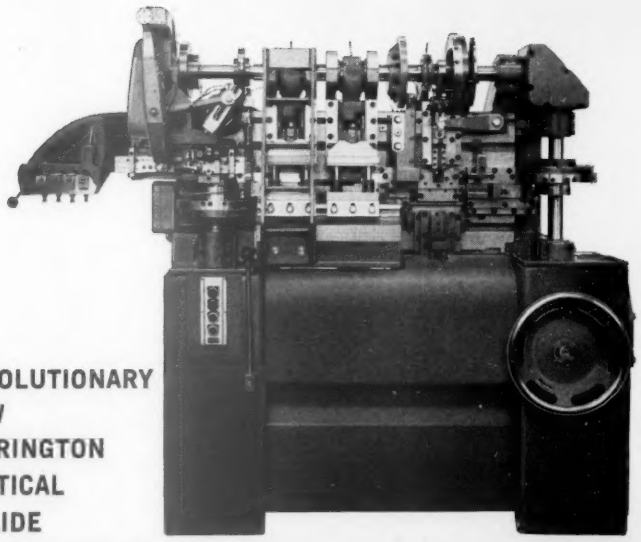
available in three models:
J-45-S, J-5-S and J-6-S
for welding high and low carbon STEEL wire, sizes from .060" to .375".

The welding cycle on "J" models is automatically completed by one down stroke of the foot pedal. Stock being welded is clamped, contact is made with welding switch and upset pressure on the weld simultaneously achieved.

Included: Annealing dies, filing vise, handshears and 4-wheel truck mounting.

MICRO PRODUCTS COMPANY

20 NO. WACKER DRIVE
CHICAGO 6, ILLINOIS
TELEPHONE STate 2-7468



REVOLUTIONARY NEW TORRINGTON VERTICAL 4-SLIDE

PAID FOR ITSELF IN FOUR DAYS

PRODUCING THIS PART

Close-tolerance
enameling wiper die . . .
having 26 critical dimensions . . .
produced by General Electric
Industrial Heating Dept.

AT FOUR TIMES THE SPEED

With one machine
replacing five
progressively tooled OBI presses . . .
and producing the part
in one-fourth the time.

AND ONE-THIRD THE COST

Saving $13,500
on a single production run
of only three days duration!

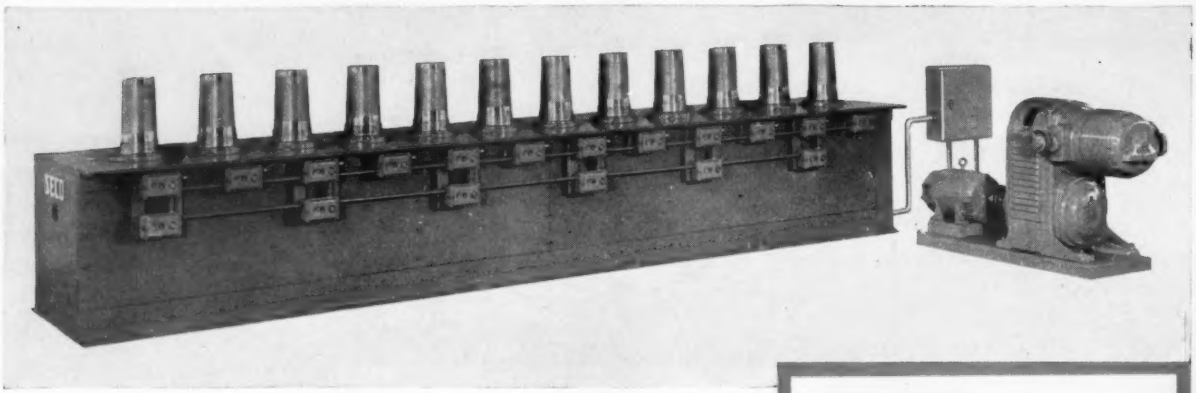
This important new production tool, the Verti-Slide, offers sensational savings in direct and indirect labor costs, parts inventory, and floor space requirements . . . through elimination of secondary operations, drastic reduction in production man-hours, and lower tooling, down-time and materials handling costs. Write or call today for complete technical data . . . or a Torrington sales engineer.

THE TORRINGTON MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO

SECO

Fine wire TAKE-UP FRAMES

The "last-word" in wire-winding efficiency!



- **Simplified Design and Construction**
- **Synchronized Electrical Variable Speed**
- **Noiseless, Vibrationless Running**
- **Greatly Increased Operating Capacity**

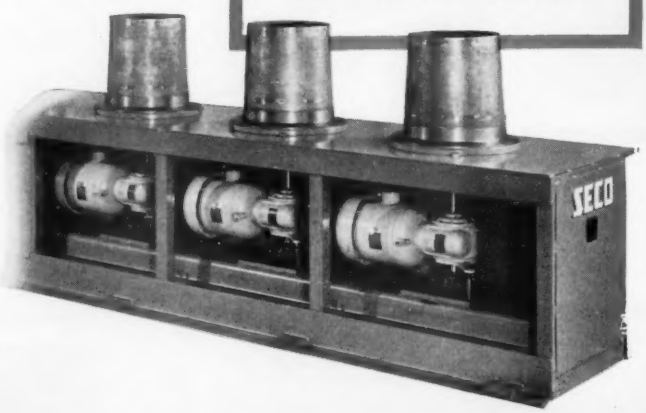
SECO builds take-up frames for handling fine gauge steel or non-ferrous wire on 8", 12", or 16" diameter blocks...with linear wire speeds up to 1,000 FPM or higher. Superior features include a multiple electrical drive system (alternating current) for synchronized electrical transmission of variable speed power.

This gives simultaneous speed changes to all spindle blocks, in ratios up to 5:1 or even 10:1 or higher. It provides push-button stop-start control to each of the gear motors driving each spindle block. Gone is the old bevel gearing, with manually operated clutches for starting and stopping the blocks.

SECO high production take-up frames are constructed to accommodate any number of spindles required. Frames with horizontal spindles can also be built. Call or write for complete information and data. Consultation invited—no obligation.

SHOWN ABOVE:
SECO Take-Up Frame and VARIDYNE Electrical Power Unit which provides synchronized variable speed to the multiple drives. AC current is employed throughout, and the VARIDYNE System "gears" all the drives together by electrical impulses.

SHOWN BELOW:
The AC squirrel-cage induction type gear motors which drive the spindle blocks through hollow bored shafts.



STEEL EQUIPMENT COMPANY
P. O. BOX 737, WARRENSVILLE STATION
CLEVELAND 22, OHIO

SECO

Who Buys Roebling Upholstery Spring Wire After You Do?

The end-user can hardly be expected to know a great deal about Roebling helical spring wire, border and brace wire, zigzag and no-sag wire, wire for automatic machines, lacing wire . . .

Thus, the qualities of uniformity, temper, tensile strength, size and finish that are yours whenever you use Roebling Spring Wire mean long life, resiliency under constant use (and abuse) where it counts the most . . . to those who buy Roebling Upholstery Spring Wire after you do.

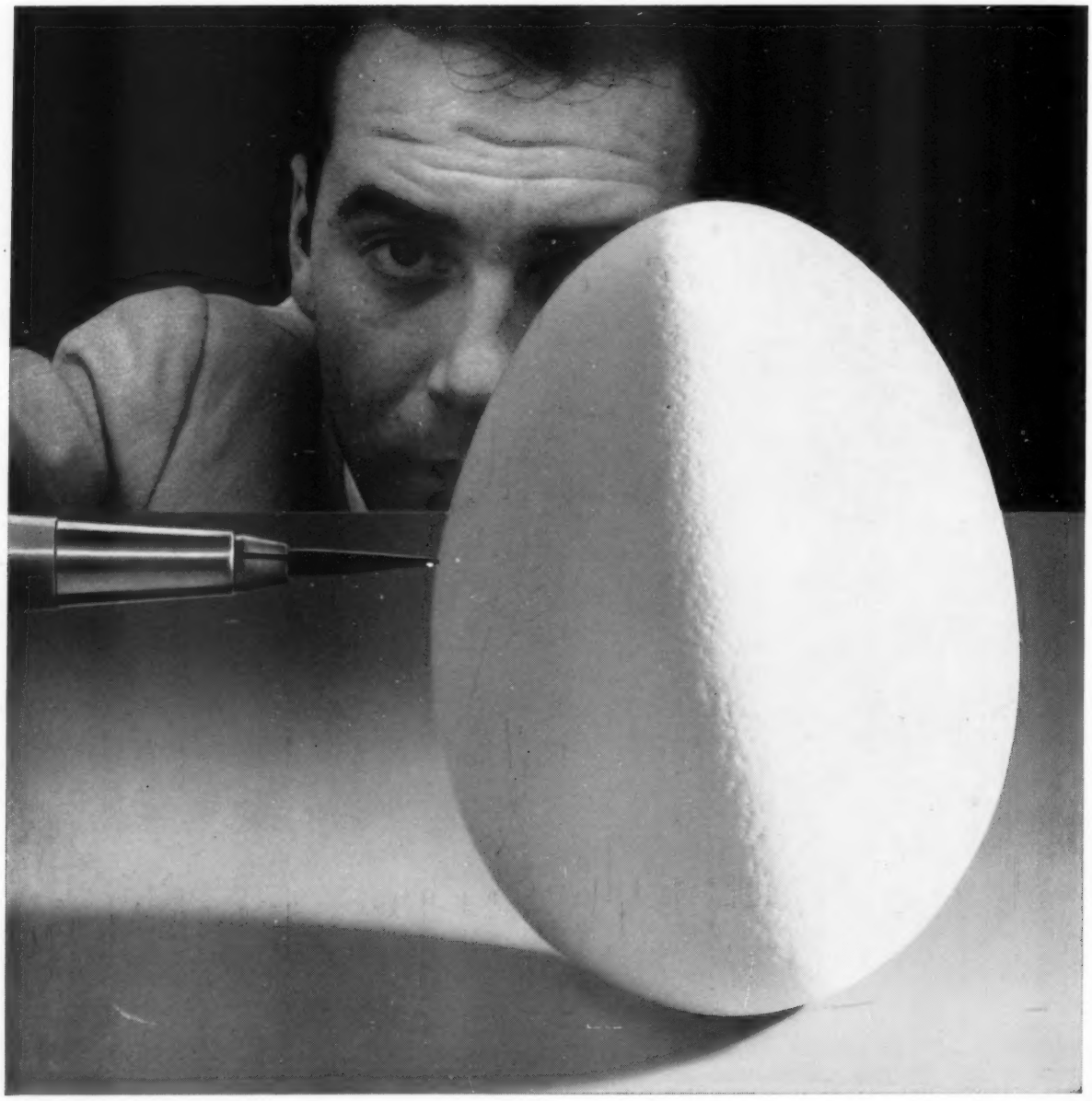
For further information on the wide range of types, the consistent superiority and availability of these and other Roebling wire products, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

Roebling... Your Product is better for it

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

A delicate problem . . .



SCHLATTER

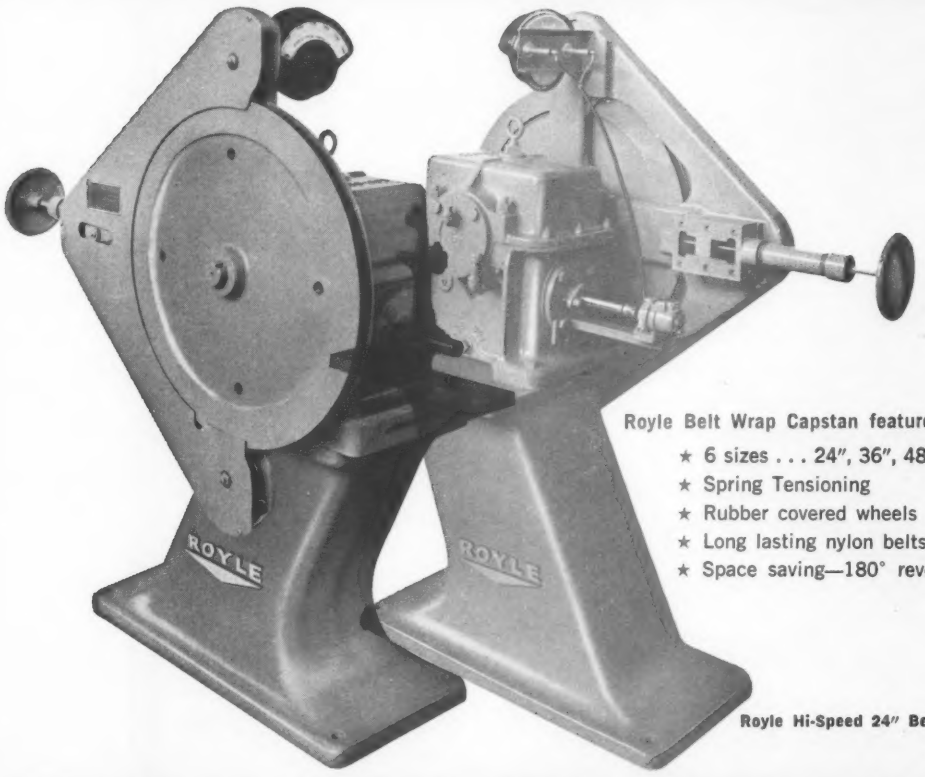
For over 40 years we have been specializing in all kinds of welding problems. New solutions are constantly being found in close co-operation with our customers all over the world. Our great experience may also assist you in solving a particularly delicate problem. Especially for the wire industry, machines and complete installations have been built – from the smallest wire butt welder to the largest wire mesh welding plant – unique in their technical conception and performance-tested in everyday use.
Therefore, do not look for the "Egg of Columbus" – let our engineers and technicians study your problems.

Representative for Canada and USA
PAUL REICHER Machinery and Equipment, Ltd.
600 Eglinton Ave., East,
Toronto 12, Ont., Canada

H. A. SCHLATTER LTD. ZOLLIKON-ZURICH (SWITZERLAND)
ELECTRIC WELDING MACHINES AND ELECTRONIC CONTROLS

for high speed wire handling

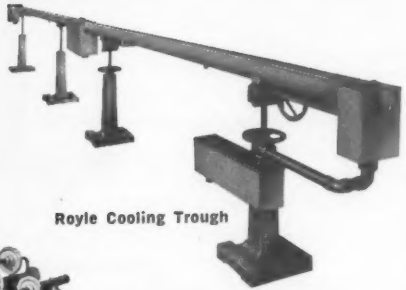
ROYLE CAPSTANS and COOLING TROUGHS



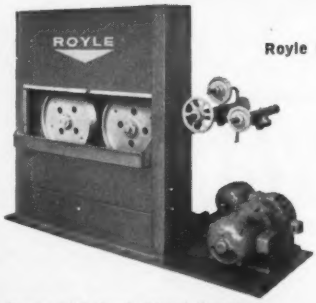
Royle Belt Wrap Capstan features:

- ★ 6 sizes . . . 24″, 36″, 48″, 60″, 72″, 84″
- ★ Spring Tensioning
- ★ Rubber covered wheels
- ★ Long lasting nylon belts
- ★ Space saving—180° reversal

Royle Hi-Speed 24″ Belt Wrap Capstan



Royle Cooling Trough



Royle 20″ Dual Wheel Capstan

Royle Engineered Cooling Trough systems are temperature regulated for exact, controlled rate of cooling.

Royle Heavy Duty Dual Capstans provide extra cooling in limited space. Sizes: 16″, 20″, 24″, 30″, 36″, 48″ and 60″.

JOHN ROYLE & SONS

Pioneered the Continuous Extrusion Process in 1880

Home Office, V. M. Hovey, J. W. VanRiper, SHerwood 2-8262. **Akron, Ohio,** J. C. Clinefelter Co., BLackstone 3-9222. **Downey, Cal.,** H. M. Royal, Inc., TOpaz 1-0371. **London, England,** James Day (Machinery) Ltd., Hyde Park 2430-0456. **Tokyo, Japan,** Okura Trading Company, Ltd., (56) 2130-2149.

John Royle & Sons, 10 Essex Street, Paterson 3, N. J.

Please, send me full information about Royle's Wire Handling Equipment.

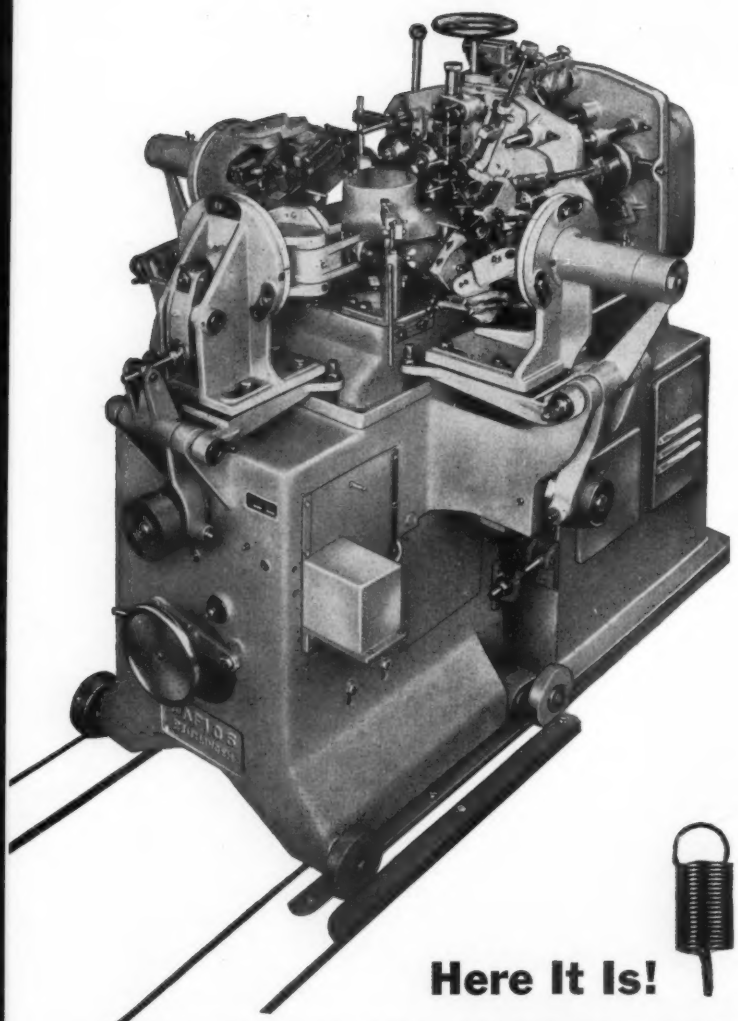
Name_____ **Title**_____

Company_____

Street_____

City_____ **Zone**_____ **State**_____

AUTOMATIC
SPRING COILING
LOOPING MACHINE

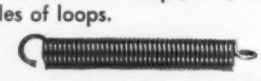


Here It Is!

THE FIRST FULLY AUTOMATIC UNIVERSAL SPRING COILING AND LOOPING MACHINE

for the production of extension springs looped on both ends. The loops can be made parallel or at any angle to each other. The uniformity of placement of loops and length of springs far surpasses results achieved by "old fashioned" methods.

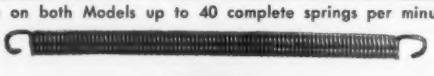
It is not only possible to produce springs with normal loops, half open loops or machine loops, but, also springs having two different styles of loops.



THE ZO SERIES OF COILER-LOOPERS ARE AVAILABLE IN 2 MODELS:

	Model ZO/30	Model ZO/15
Wire diameters	.0197" to .0475"	.0394" to .118"
Lengths of Springs	.750" to 5½"	1¾" to 7"
O. D. of Springs	.200" to ⅝"	.394" to 1"

Production on both Models up to 40 complete springs per minute.



WAFIOS

U. S. Office: WAFIOS MACHINERY CORPORATION
61 Hudson Street, Hackensack, New Jersey

Canadian Representative: Mr. O. HRBOTICKY
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WAFIOS MASCHINENFABRIK REUTLINGEN/GERMANY

WHITACRE 22″ WIRE DRAWING DEAD BLOCK

Continuous Production—Efficiency Approaching 100%

Gives you these advantages

Continuous increased production achieved by: • No down time for stripping • Permits packaging into stationary container or uninterrupted palletizing on stems • No tangling nor snarling from handling • Design simplicity. No back-gearing nor similar mechanisms • Greatly reduced floor space requirements • Dies in supplying drawing machine can be changed without stopping dead block • Accumulation type machines can be "run down" without stopping dead block • Continuous inspection and sampling • Breaks welded in production — low scrap loss • Increased production with lessened operator fatigue • Maintenance eliminated except for occasional lubrication of four main bearings and two motor bearings • Dead block can be located anywhere with wire literally piped from wire drawing machine • Extra large packages for in-process wire • Greatly reduced handling and in-plant transportation costs • Low capital investment.

OTHER MODELS AVAILABLE

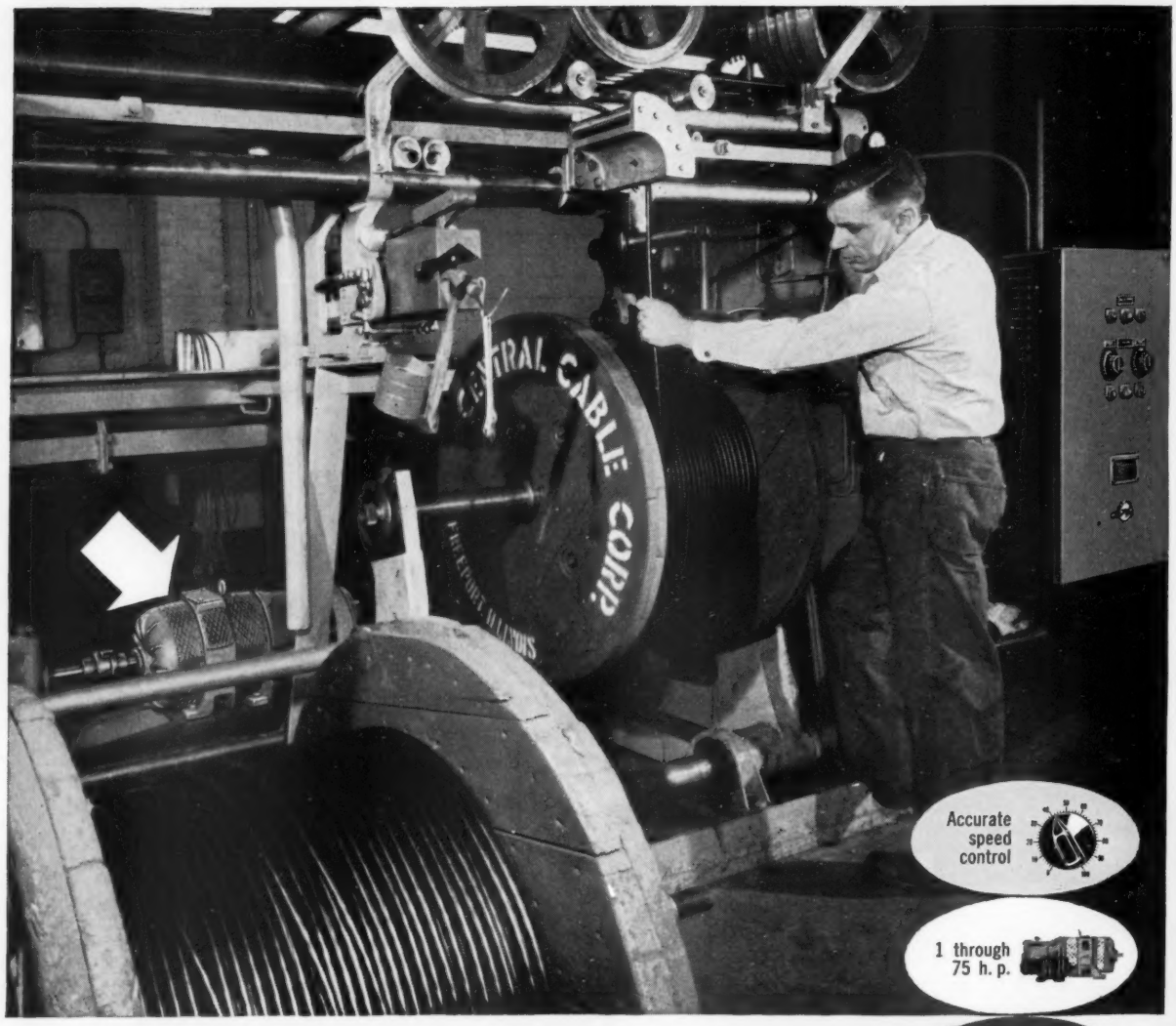
16″ Wire Drawing Dead Block, Model DB-16A • 26″ Wire Drawing Dead Block, Model DB-26A • Combination 16″ and 22″ Galvanizing or Tinning Dead Block Take-ups, Model GB-2216A • 26″ Heavy Wire Galvanizing or Tinning Dead Block Take-up, Model GB-26B.

Write Today For Specifications And Name Of Nearest Distributor

WHITACRE ENGINEERING & MANUFACTURING COMPANY

5649 ALHAMBRA AVENUE • LOS ANGELES 32, CALIFORNIA • CAPITOL 5-2476

WHITACRE



How to get higher wire production at lower cost:

Louis Allis provides dependable A. C. adjustable speed drives for wire lines

Here's a dependable tip for boosting production on any continuous extrusion line producing rubber or plastic insulated wire: Louis Allis Ajusto-Spede® can give you simple control of your wire-line process that will assure proper tension on the wire, plus correct relative speed of wire and plastic flow into the die at all times.

The result? Wire coated to a dimensional accuracy that will meet the most rigid specifications . . . produced with excellent uniformity at a high output rate, and with the minimum of scrap.

Louis Allis controls give you "one-dial" master speed control to assure proper synchronization between extruder, capstan, and take-up.

The proof lies in the many successful Louis Allis wire-processing installations. There's a Louis Allis sales engineer in your area who'll gladly give you their names, and who can give you expert advice on the correct drives for powering *your* wire line.

Contact your nearby Louis Allis District Office or write The Louis Allis Co., 451 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

AMERICAN LAUBSCHER
Corporation
presents

NIEHOFF WIRE DRAWING UNITS

Modern Drawing, Annealing and Spooling-Units for non-ferrous metals. These units can be supplied in various designs for ... per, brass, and aluminium wires, etc.

The unit shown on the picture below has been designed for ... nealing copper wires within a finishing range of 0.055" to 0.01... diameter.

EXCLUSIVE REPRESENTATIVE
FOR U.S.A. AND CANADA

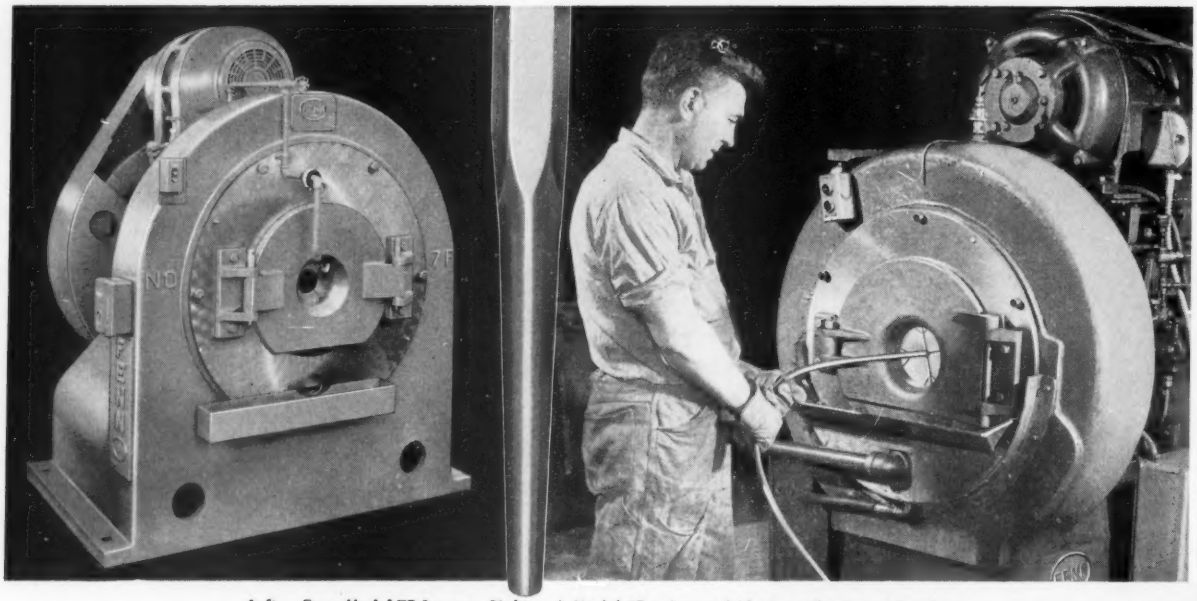
AMERICAN LAUBSCHER
Corporation

FISK BLDG. 250 WEST 57th STREET
NEW YORK 19, N.Y.

NIEHOFF

NIEHOFF MACHINE WORKS

SCHWABACH NEAR NURNBERG WESTERN GERMANY



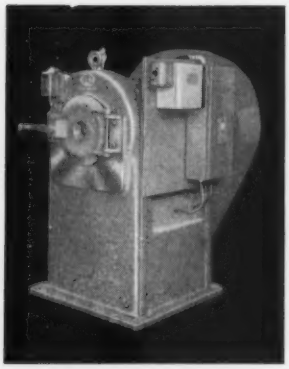
Left — Fenn Model 7F Swager. *Right* — A Model 6F points end of wire coil prior to drawing.

Wire Pointing with FENN Swaging Machines

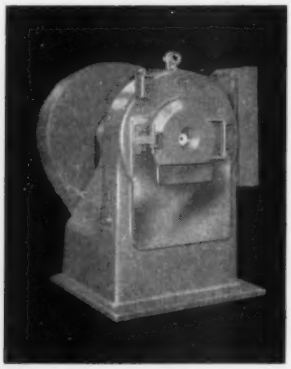
The wide preference in the wire industry for Fenn Swaging Machines for primary pointing prior to drawing can be attributed to their ability to produce heavy reductions with dependability and with minimum maintenance. From the rugged one piece solid meehanite frame to the precision machined roll cage assembly, Fenn Swagers are engineered and built to deliver under heavy production schedules. Only Fenn makes all types of swaging machines . . . in a complete range of sizes that will swage solids from 5/32" to 3-3/8" . . . and in 2-Die or 4-Die models. A complete line of manual and hydraulic feeds greatly increase the Swager's productivity and accuracy . . . with far less operator fatique. We invite you to consult with our swaging engineers.

The Fenn Manufacturing Company, Newington, Conn.

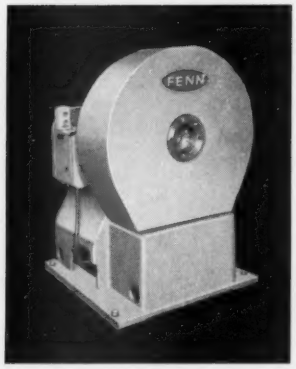
Rotary 2-Die



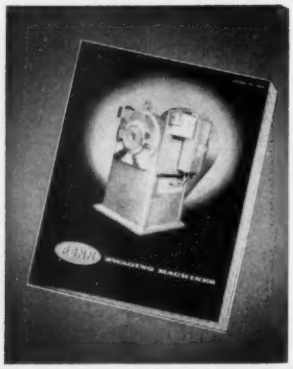
Rotary 4-Die



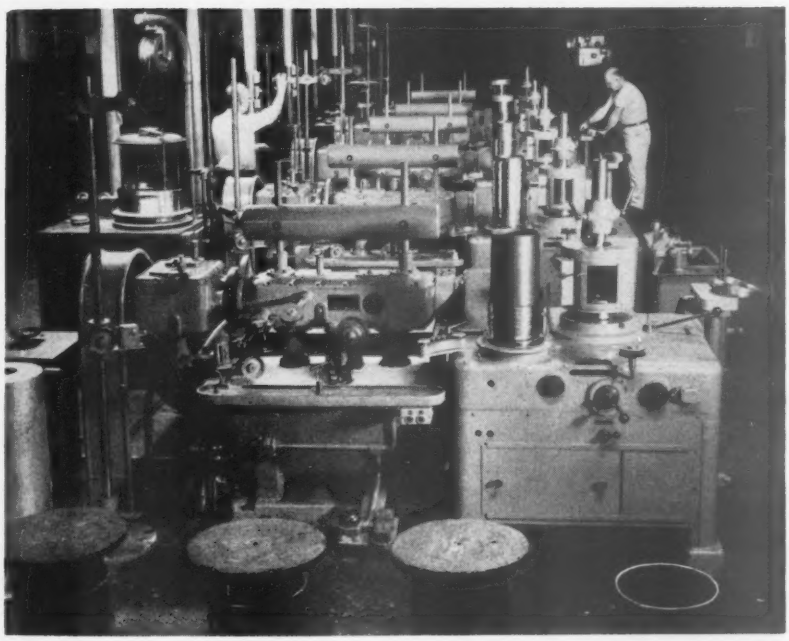
Stationary Die



Write for Catalog!



BEFORE: Here, wire is being drawn "the old fashioned way."



AFTER: Shiny and new, with the look of tomorrow, the new wire drawing equipment at Prentiss produces wire better and faster.

NEW WIRE MACHINES UP PRENTISS OUTPUT

Five new wire drawing machines have been installed at Prentiss Wire Mills, Riverside-Alloy Metal Division, according to J. R. Fuller, manager of Prentiss. The new high-speed equipment has replaced ten rows of antiquated single hole tub drawing benches.

The new wire drawing machines are now in production and have drawn wire down to .008 inches diameter, only slightly thicker than a human hair, maintaining extremely close tolerances. They will be used to draw all types of wire including nonferrous alloys and high and low carbon steels.

After drawing, the machines automatically wind finished wire on spools or cores with capacities from 10 to 60 pounds, or in coils. Increased spool capacity pays off for customers by permitting longer uninterrupted production runs.

A number of new specialty wire products are now practical with the precision, high-speed equipment which constitutes the latest step in the continuous modernization of Prentiss Wire Mills.

"PRENTISS" adds "HERBORN" Wire Drawing Machines To Their Line

"HERBORN" TF IIIc Wire Drawing Machines photographed at the plant of Prentiss Wire Mills, Riverside Metal Alloy Division, H. K. Porter Company, Inc., at Holyoke, Massachuetts.

***Photos and text courtesy "Re:Porter," published monthly by H. K. Porter Company, Inc.**

Please send your inquiries to:

MASCHINENFABRIK HERBORN BERKENHOFF & DREBES A.-G. **HERBORN/DILLKREIS** GERMANY

HERBORN MACHINERY CORPORATION, 61 Hudson Street HACKENSACK, N. J.

WHY MOCO WIRE PROCESSING EQUIPMENT IS YOUR FINEST LONG RANGE INVESTMENT

Magnet wire processing equipment as developed, designed and manufactured by Michigan Oven Company incorporates the same principles of controlled convection and recuperative catalytic incineration which we pioneered and developed for other heat processing applications.

After years of concentrated research and coordinated effort with magnet wire manufacturers, MOCO equipment has been accepted as the finest investment possible in long lasting wire production machinery.

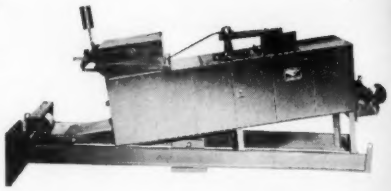
The techniques used are the very latest.

The equipment has been fully tested under the most exhaustive production runs. Michigan Oven Company is aware of all the problems and will cooperate in recommending the proper equipment for specific needs—and, of course, will render special engineering service for unusual applications.

The equipment shown is a partial view of MOCO's wire processing line. Your inquiry on all types of magnet wire processing equipment is welcomed and will be given immediate attention.

SELF GENERATING ATMOSPHERE ANNEALERS

This is the first gas-fired annealer using the heating equipment as an internal inert atmosphere generator. Advanced mixing and burning equipments are utilized which exclude the need for external sources of steam or costly inert atmospheres. Available in horizontal or vertical mounting positions.

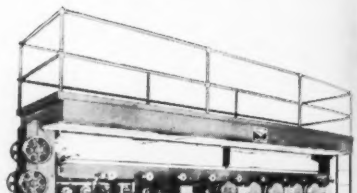


HORIZONTAL WIRE ENAMELING OVENS

These horizontal fine wire enameling ovens for either gas or electric heating operate on MOCO's high velocity recirculating principle. They are equipped with internal catalysts insuring low fuel consumption, freedom from condensation and elimination of objectionable exhaust fumes. Accessories such as enamel applicators and sheaves are available.

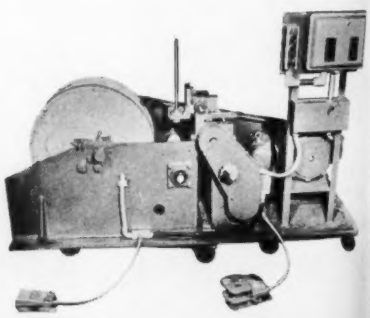
UNIVERSAL REEL OR DRUM PACKER

MOCO was first to develop and install a universal wire packaging machine with combination takeup unit permitting packaging of wire on 6" or 12" diameter spools or in either 100 lb. capacity pails or 500 lb. capacity barrels. Packaging arrangements are optional from spindle to spindle without machine alteration.



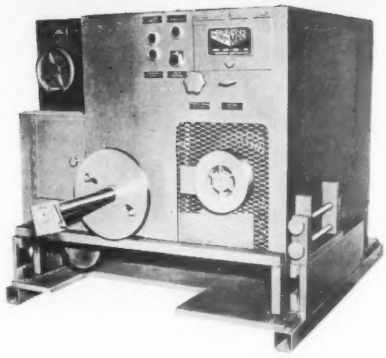
SPECIAL REELERS

High speed, heavy-duty wire traversing takeups for heavy round and rectangular conductors. Reel capacity up to 1000 lbs. and speeds up to 500 feet per minute. A variety of drives are available for tieing in to various types of equipment.



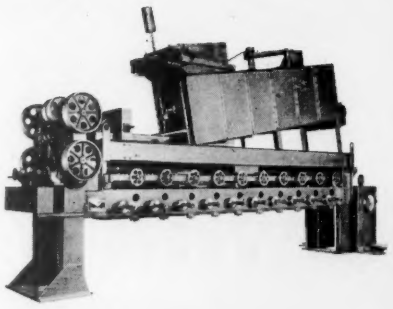
LEVEL WINDERS

Traversing reel type, layer wind takeups for heavy round and rectangular conductors. Infinitely variable traverse adjustments over a wide range of wire sizes. Reel capacity — 500 lb. maximum. Wire speed — up to 100 feet per minute.



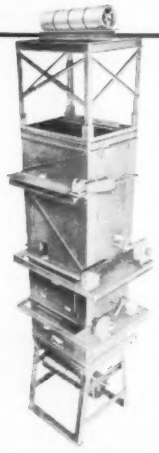
HEAVY ROUND AND RECTANGULAR TAKEUP

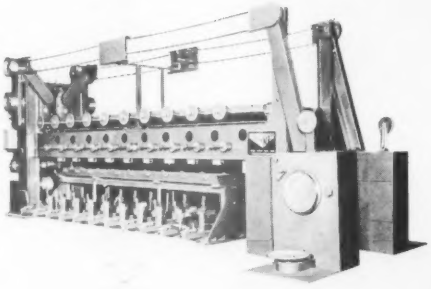
Four strand takeup unit for heavy round and rectangular conductors, with preannealing ovens mounted on top. These units are available up to 6 strands, with either dual capstan or fleeter ring assemblies.



VERTICAL WIRE ENAMELING OVENS

This vertical two-zone high velocity axial flow recirculating wire enameling oven has internal recuperative catalytic unit which eliminates condensate and recovers latent solvent energy. Five other models complete the range from the finest wire through large rectangles.



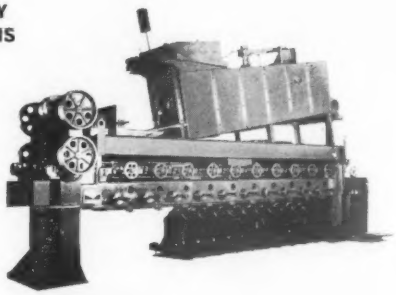


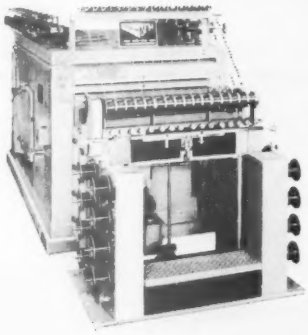
INTERMEDIATE SUPPLY AND TAKEUP MECHANISM

20 Line takeup and supply stands for wire sizes .0089 to .025, inclusive. These units are also available with any number of auxiliary barrel packing units. Designed for operation with the vertical wire enameling oven shown opposite. Custom engineering for special spooling requirements is available.

ENAMELED WIRE SUPPLY AND TAKEUP MECHANISMS

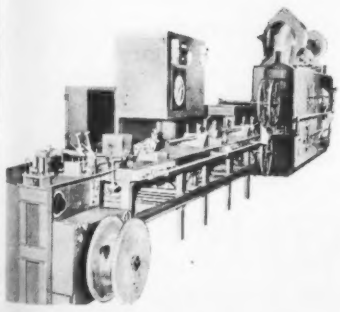
20 Line Heavy-duty spoolers for wires up to and including .072 diameter. These units may be equipped with any number of auxiliary barrel packing units and provide for mounting supply stands beneath and preannealing oven on top. Various arrangements are available for special purposes.





FINE WIRE ENAMELING MACHINE

Typical of the complete line is this type "B" machine which handles wire from 31 A.W.G. to 42 A.W.G. Five other models complete the range from the finest wire through large rectangles. The horizontal, high volumetric, recirculating double-pass oven allows greatly increased production by rapid heat impartation and a high degree of temperature uniformity.



TEXTILE INSULATING AND IMPREGNATING MACHINES

MOCO was first to develop and install rapid heat-cool tunnel type varnish impregnating ovens. This MOCO double insulating machine and layer wind takeup applies two servings of glass or yarn and four coats of baked insulating varnish simultaneously to heavy rounds and rectangulars. Quick starts and stops are accomplished without production loss.

MICHIGAN OVEN COMPANY

MOCO

WIRE EQUIPMENT DIVISION
425 Brainard Street
Detroit 1, Michigan

Please send me complete information on the many outstanding MOCO features:

- ☐ Wire Enameling Machines
- ☐ Glass Insulating Machines
- ☐ Other
- ☐ Self-generating atmosphere Annealers
- ☐ Reel-R-Drum Packers

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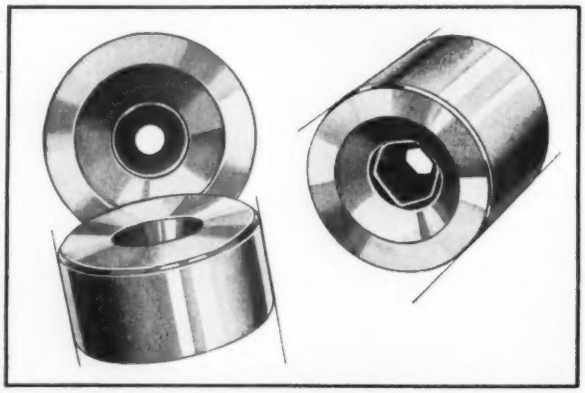
Metallurgical Memo from General Electric

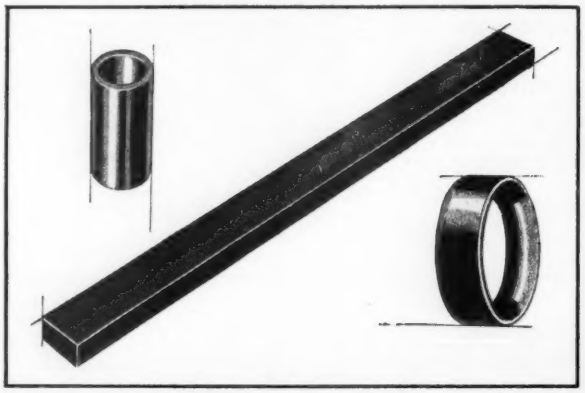
"MOVING METAL" WITH G-E CARBOLOY® CARBIDES

maintains uniformity in size... better finish... less cost per ton with more durable grain structure in the part

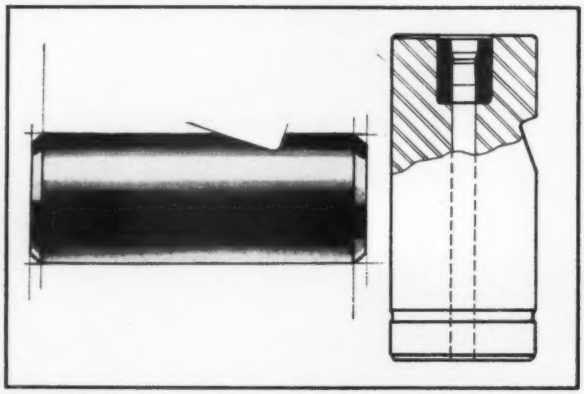
Continuing research by General Electric's experienced metallurgists and technicians gives you Carboloy cemented carbides of highest quality and uniformity—carbides designed to "move metal" at lower cost and with less metal waste. *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Ave., Detroit 32, Michigan.*



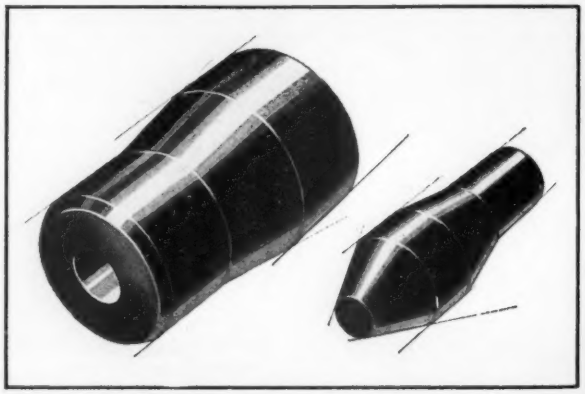
GET MORE WIRE TONNAGE with uniform size and finish. Carboloy carbide wire, bar and tube dies boost product output, permit longer runs with less die wear, minimize downtime. Available in round, square, hexagon shapes.



BOOST WIRE PRODUCTION SCHEDULES by wear-proofing critical parts with G-E carbide wire guide bushings, strips, and guide rings on wire stranding and processing machinery. Last up to 100 times longer in some cases than those made of other materials!



TOP QUALITY AND PERFORMANCE in boltmaking machinery depends on header extrusion dies equipped with Carboloy cemented carbides—which help to produce more uniform parts to closer tolerances; resist stress and strain of the heading and extruding operation.



TUBE DRAWING WITH CARBOLOY MANDRELS provides uniform wall thickness. Tailored to your order, G-E mandrels come in brazed and solid carbide styles. Brazed-type custom-made from standard and special Carboloy nibs. Available from your Authorized Die Distributor or Diemaker.

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CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

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CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

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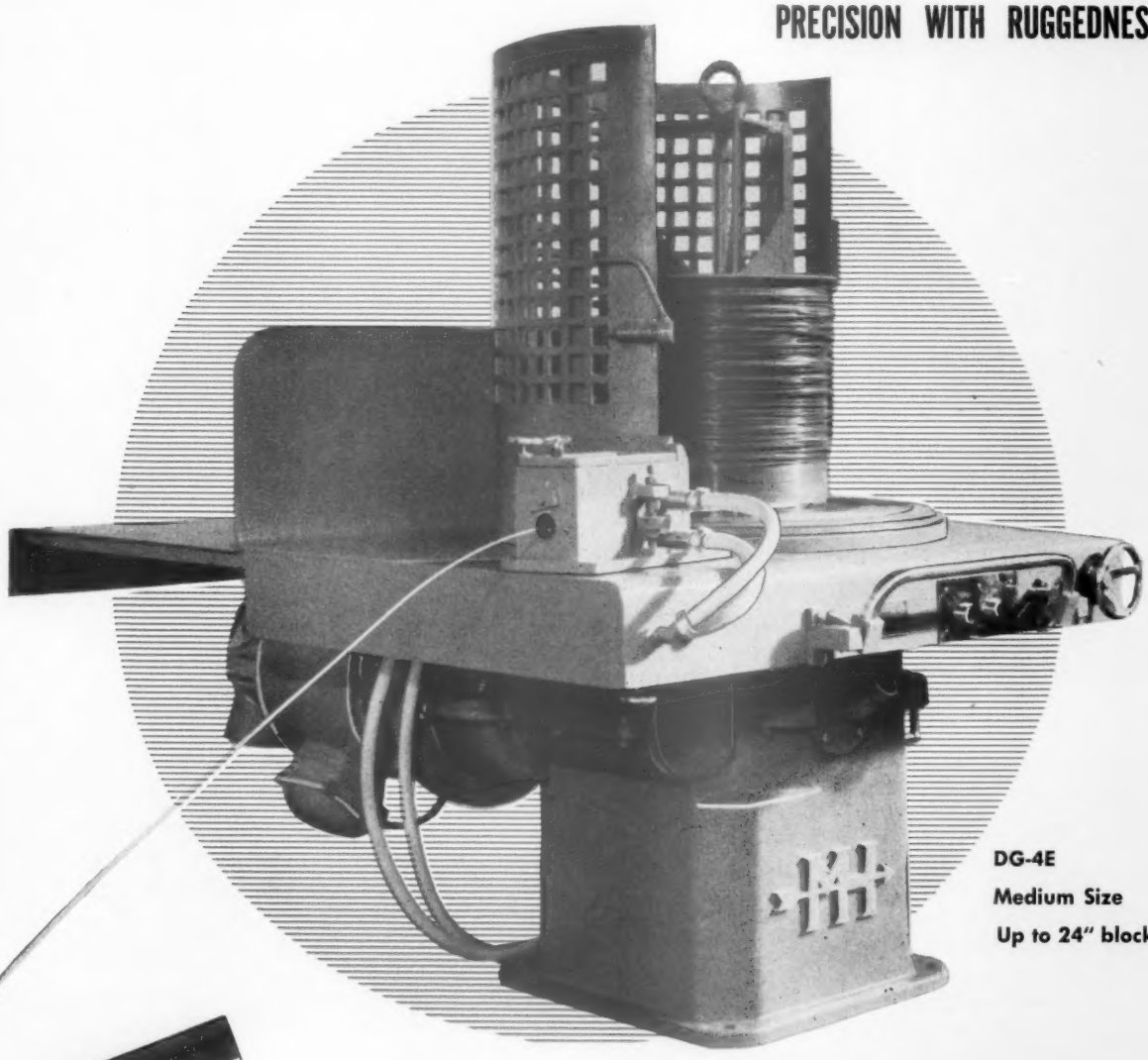
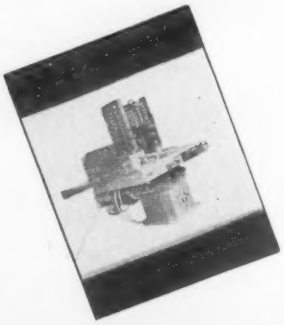
SINGLE or DOUBLE DECKED

PRECISION WITH RUGGEDNESS



DG-4E
Medium Size
Up to 24" block



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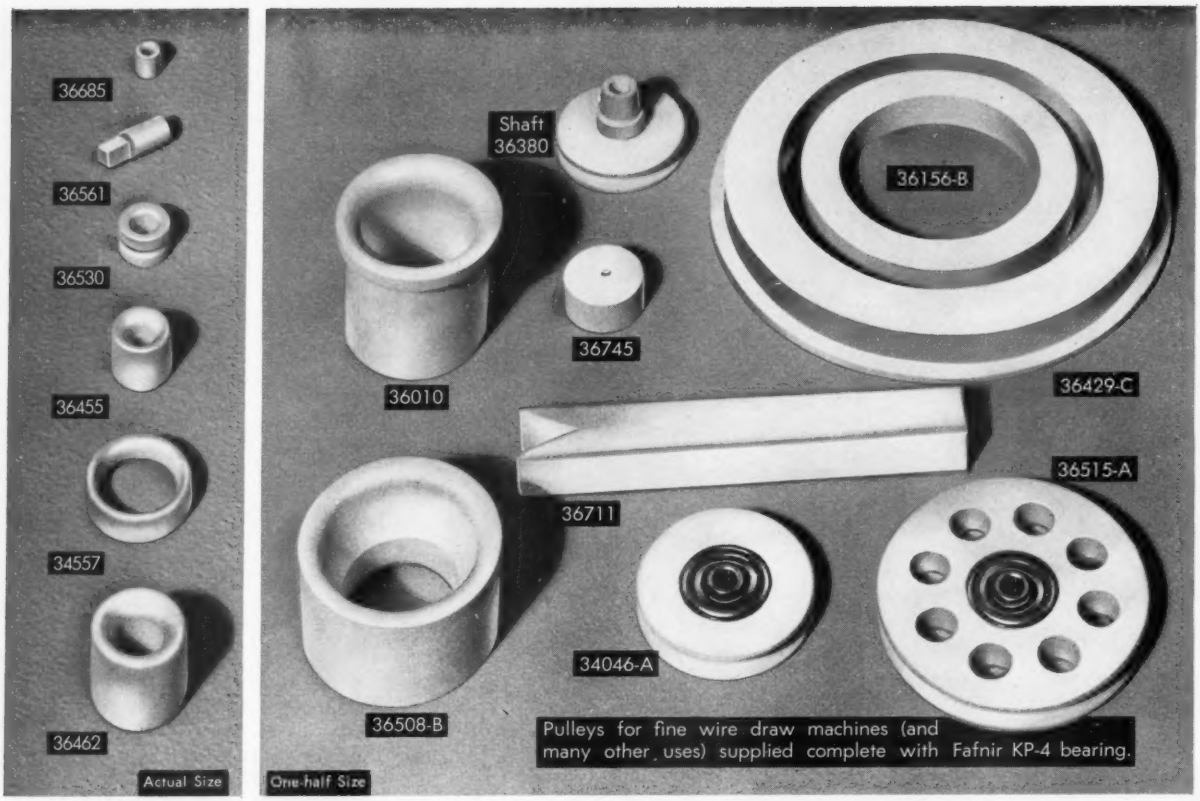

AlSiMag guides for fine wire draw machines, bunchers, hold down guides, sheave applications and others.

AlSiMag® Alumina Ceramic WIRE GUIDES

More wear resistant than the hardest metals. Smooth. Hard. Non-corrosive. High heat resistance. Held to precision tolerances where necessary. Homogeneous. Since the material is the same all the way through, gradual wear simply exposes new surfaces of the same material.

AlSiMag guides are available in various degrees of finishes for specific applications.

Standard or custom designs. Wide range of shapes and sizes. Samples of present production sent on request. Test samples to your specifications supplied promptly at reasonable cost.

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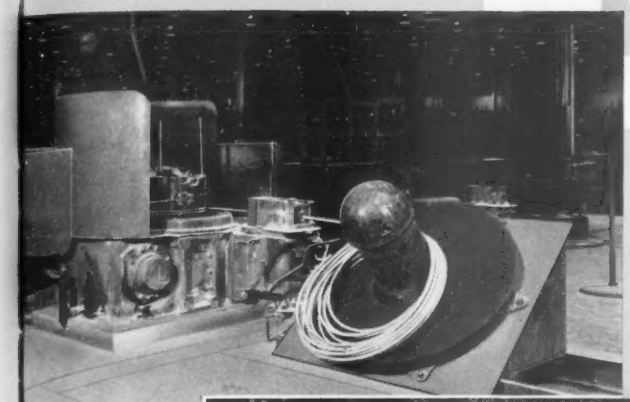
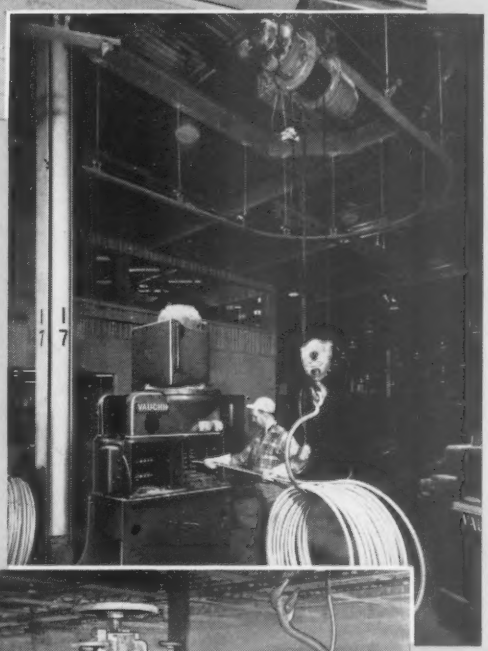
A TIP FOR THE TIMES

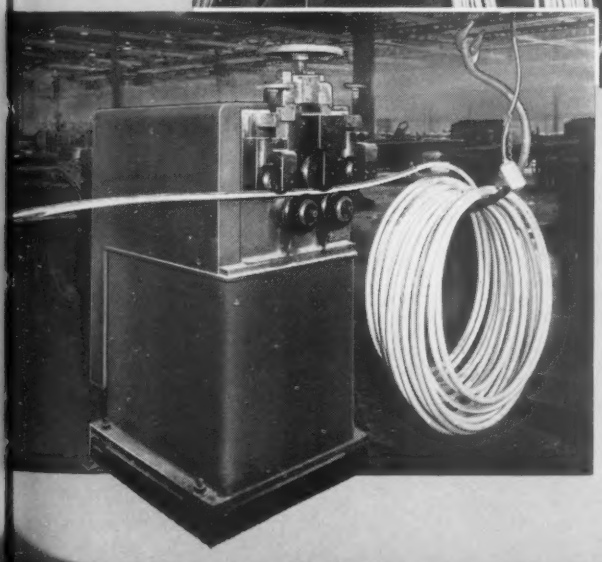
SPEED HEAVY WIRE PRODUCTION

with ADVANCED Vaughn®

AUXILIARY EQUIPMENT







new FLOOR REEL

with Positioning Base

Meeting today's need for better pre-drawing preparation and handling of heavy wire, Vaughn presents this new Floor Reel upon which the coil is lowered, with Positioning Base. This advanced equipment permits the straightened, pointed wire end to be passed through die to grip with small effort by the operator—and better production!

new *Extra-Heavy* 4-ROLL CONTINUOUS POINTER

This king-size pointer is capable of accommodating a range of wire from ½" to 1¼". It has two vertical and two horizontal rolls for ease of pointing without twisting the wire, and is in every way a heavy, rugged, long-life machine for the most arduous service.

new ROLL STRAIGHTENER

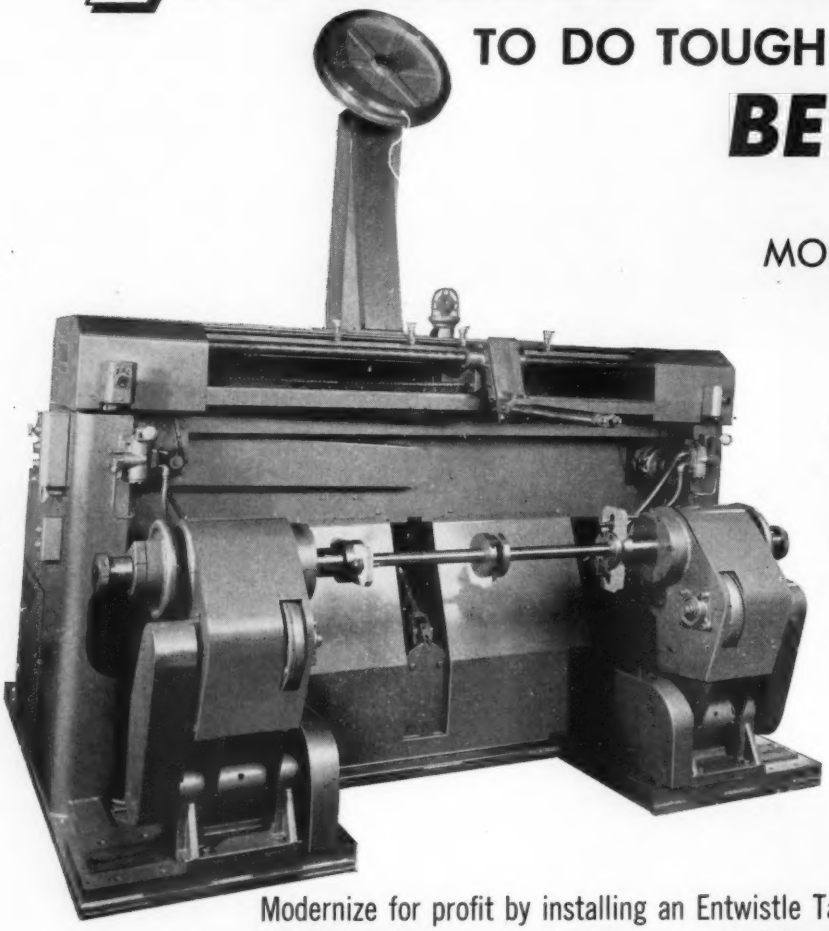
At the beginning of the pre-drawing preparation cycle is the new Vaughn 3-roll straightener, where a section of the trolley-transported wire coil is mechanically straightened. This makes handling to pointer and die box an easy matter, contributing to the time and manpower savings that help boost production with modern Vaughn equipment. Details? Gladly, on request.

The Vaughn MACHINERY COMPANY

Cuyahoga Falls, Ohio, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

ENTWISTLE BUILT TO DO TOUGH JOBS . . . BETTER!



MODEL "THE-24/36" DUAL REEL

A shaft-type dual continuous take-up for 24" O.D. through 36" O.D. reels weighing up to 1400 Lbs. and for speeds up to 2000 F.P.M.

Modernize for profit by installing an Entwistle Take-up. Handle a wider range of reels and materials on fully automatic equipment.

YOU get these built-in features:

Eddy-current drive and controls
Adjustable, maintained speeds and tensions.
Electric brakes and clutches.
Pneumatic lift and cut-off.
Infinitely adjustable traverse, pneumatically reversed.
Predetermined, Motorized traverse crossover.
Effortless, trouble free, silent service.
Includes wire reservoir tower and measuring.

ASK FOR SPECIFICATION 3C WITH QUOTATIONS

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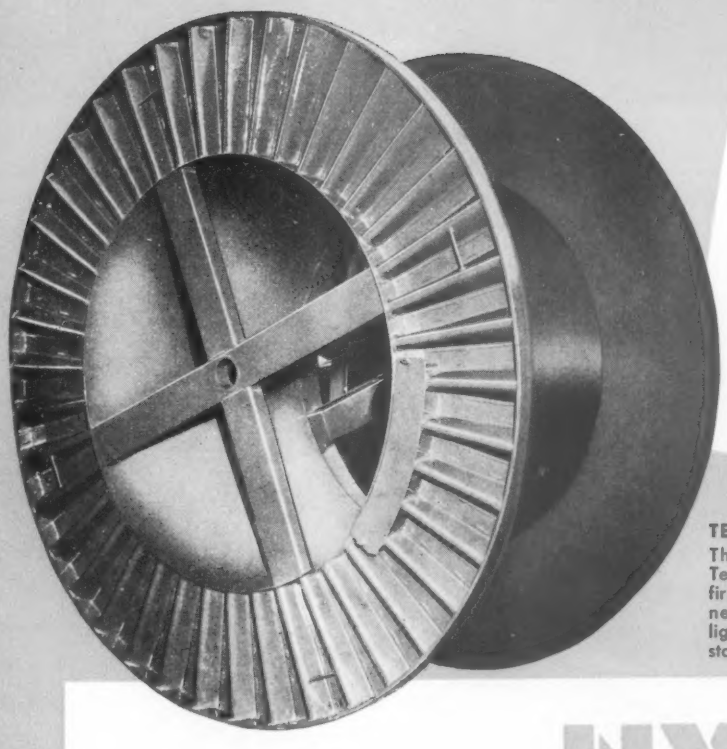
Proven By Actual Test!



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CHEMICAL, ELECTRICAL, METALLURGICAL AND MECHANICAL
Engineers
TELEPHONE • BOWLING GREEN 9-6330-9
47 WEST STREET
NEW YORK 6, N. Y.

March 9, 1959

New York Engineering Company
75 West Street
New York 6, N. Y.

Gentlemen:

We have tested your "NYECO" Light Weight Steel Reel, 78" x 48" x 36" traverse, Drawing Number 51015, and offer the following comment with reference to our Test Report:

ASSUMING A CONSERVATIVE SAFETY FACTOR OF 2 BASED UPON YIELD STRENGTH, IT IS OUR OPINION THAT THE CABLE REEL CAN BE SAFELY LOADED TO 16,650 LBS. WITHOUT DISTORTION.

Very truly yours,
NEW YORK TESTING LABORATORIES, INC.

Roger Harvey

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Roger Harvey
Managing Director

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TESTED AND APPROVED!
This letter from New York Testing Laboratories, Inc. confirms the superiority of the new NYECO smooth-faced, light weight steel reel over standard reels.

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SMOOTH-FACED LIGHT WEIGHT STEEL REEL

NOW AVAILABLE FROM NYECO . . .

greater protection against damage in shipping and processing with this rugged, weather-resistant, warp-proof, NYECO Steel Shipping Reel. All reels are furnished with four cross-arms unless otherwise specified. Drive-holes optional. No die charges or extras . . . any drum diameters or traverse. Flange diameters 42" to 90" inclusive.

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ANY QUANTITY—ANY SIZE—
ANY LOAD FLANGE DIAMETER
from 42" up

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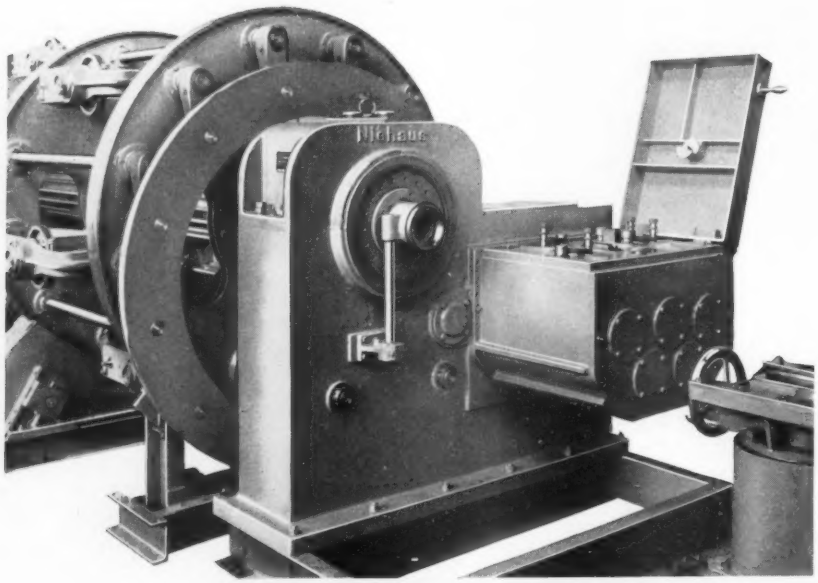
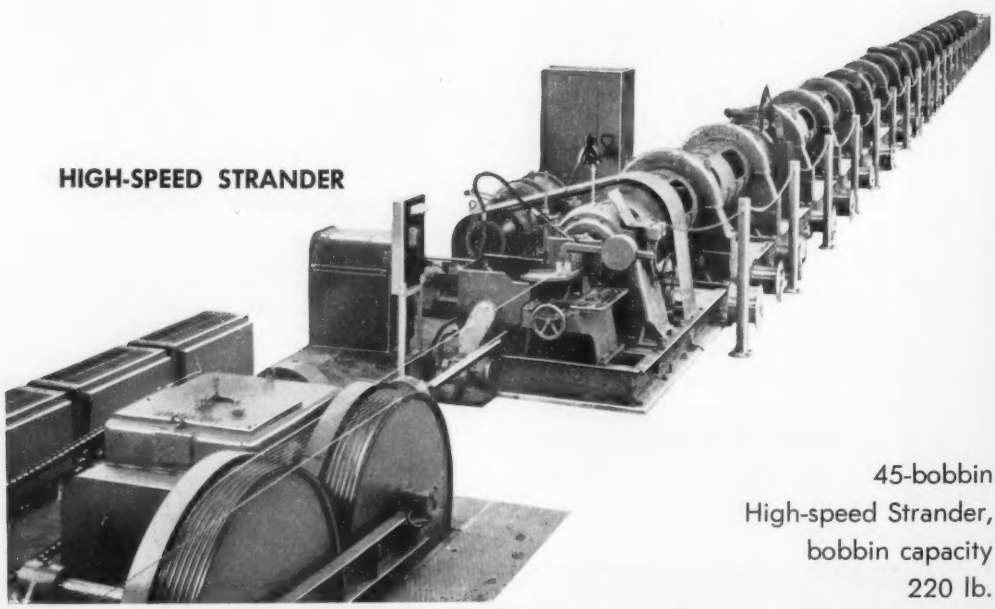
ELECTRIC-CABLE MACHINERY • WIRE-ROPE MACHINERY

PLANETARY STRANDER



We manufacture: Stranding and Rope-closing Machines of tubular and planetary design, of any size and for any number of bobbins, as well as the pertinent auxiliary machinery and equipment.

HIGH-SPEED STRANDER



45-bobbin High-speed Strander, bobbin capacity 220 lb.

MASCHINENFABRIK K. A. NIEHAUS • DUSSELDORF-RATH

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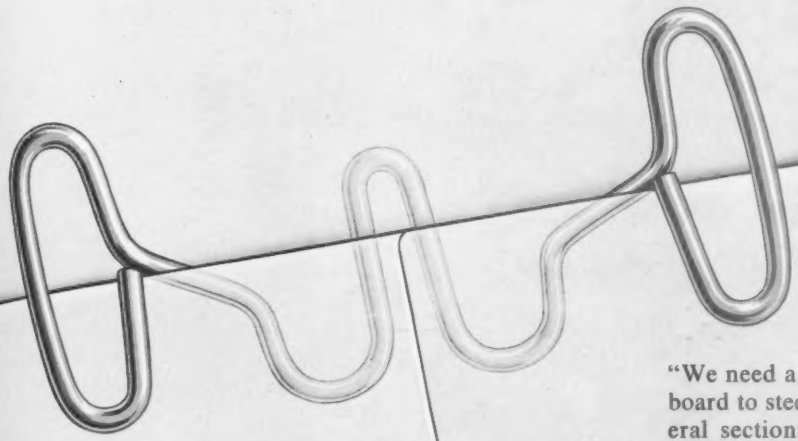
KEYSTONE WIRE... DUDEK & BOCK

turn an idea into a reality



"We need a clip that will securely fasten gypsum board to steel upright studs—or join and hold several sections of board in perfect alignment for plastering. Here's what it must look like."

This is the challenge. Designers at Dudek & Bock, Chicago, Illinois, roll up their shirt sleeves. They analyze wire requirements: tensile, uniformity. Length of run—a long one. Delivery—soon.

What wire fits these requirements? Keystone Silver Brite Galvanized high tensile wire is first choice. They know from experience they can depend on Keystone wire to perform exactly as calculated—order after order—run after run. By standardizing on Keystone wire for the majority of their needs, Dudek & Bock simplify quality control and manufacturing problems. They regularly use a wide selection of Keystone wire to meet their forming and spring requirements—this includes low and high carbon wire, brite and galvanized.

Result: Another fastener problem solved with wire . . . delivery on schedule of this gypsum board clip and thousands of other items . . . and maximum customer satisfaction.

Perhaps creative imagination and Keystone wire can help you build your products faster, better, at lower cost. A Keystone cold heading or wire forming specialist is available to help you.

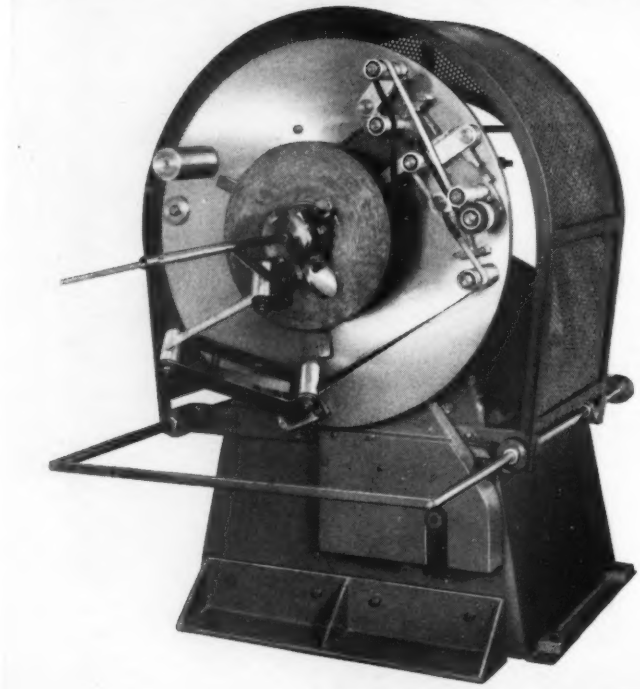
Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

NEBUTTCO

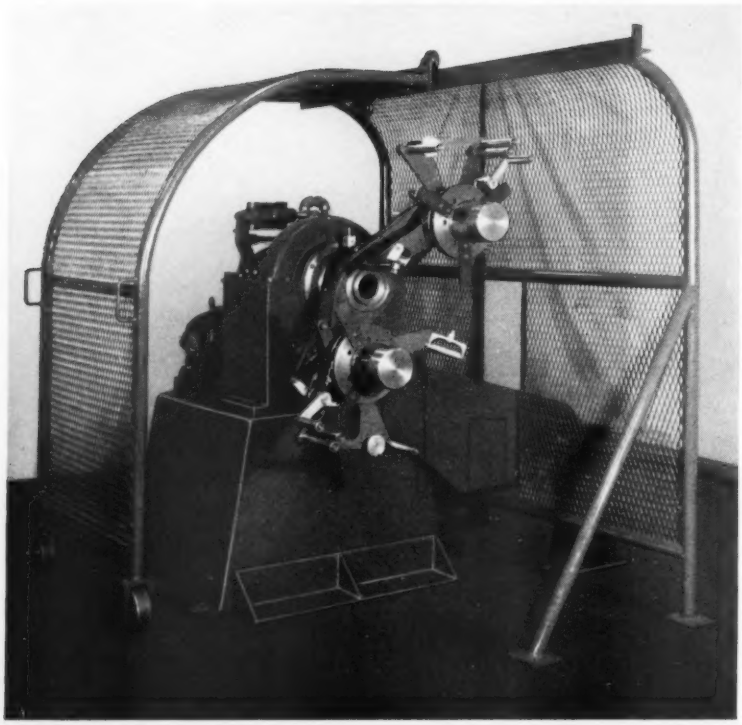
High Speed TAPING MACHINES



For Fast, Accurate Application of Paper, Cambric, Natural or Synthetic Rubber on Electric Cables.

Nebuttco High Speed Taping Machines are available in single or multiple head units equipped with motor drive, capstan and take-up. Individual units designed to operate with other types of equipment can be furnished to meet your specific requirements.

Nebuttco Concentric Machines are engineered to operate at a maximum speed of 650 RPM with tape pads 24″ diameter x 4″ wide x 6″ eye.



Nebuttco Eccentric Machines are made with from one to four tape pads. Maximum speed of 300 RPM with tape pad 20″ diameter x 4″ wide x 3½″ eye.

WRITE FOR COMPLETE DETAILS!

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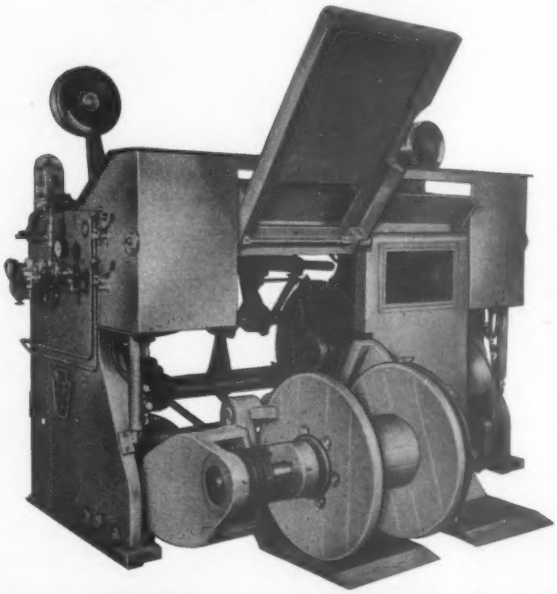
BRAIDERS • CABLERS • TAKE-UPS • BUNCHERS
STRANDERS • TAPING MACHINES

NEW HIGH-SPEED DUAL REEL TAKE-UP



Model DR-24HS Continuous Reeling of Insulated Wire at up to

4000 FPM

The new Davis-Standard high-speed Dual Reel Take-Up is designed to handle the lighter gauge wires at up to 4000 feet per minute with positive, clean cut-over at full wire speed.

DUAL MOTOR DRIVE — The empty reel is running at exact wire speed during cut-over. Only a dual motor drive permits the empty reel to spin faster than the full reel so that drum speed matches full reel build-up.

PATENTED RETRACTABLE WIRE GUIDE — Completes lay on full reel while main wire guide traverses at normal speed to empty reel starting position.

FRICTION DISC REEL DRIVES — Engage reels in any position, eliminate line-up of dog pin holes. Double pintles clamp both sides of each reel for smooth, high speed revolution without end play.

COMPLETELY AUTOMATIC GUARDING — Cannot be opened until full reel has stopped. Closes before reel drive starts.

For complete details on the new high-speed Dual Reel Take-Up Model DR-24HS for 12 to 24 inch diameter reels

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HUBBARD TRAVERSES

EASILY ASSEMBLED IN 4 RAPID STEPS TO SAVE COST AND TIME

1 PLACE BOLTS IN REEL HEAD

2 SET HEAD ON FLOOR, BOLTS UP

3 TRAVERSE POSITIONED ON WOODEN HEAD

4 TOP HEAD LAID ON TRAVERSE AND BOLTED DOWN

HUBBARD TRAVERSES are made for nailed wood, plywood, metal bound and cast flanges, constructed of one sheet of metal—rolled, welded and flanged—in painted galvanized or plain finishes . . . easy to assemble and to repair . . . reduces damage to cable . . . increases life of reel due to rigid one piece barrel.

Besides TRAVERSES, every type of REEL and SPOOL—returnable and non-returnable in all materials is made by HUBBARD for shipping and shop use.

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HUBBARD SPOOL DIVISION

The American Pulley Co.

GARRETT, INDIANA

The Wire Outlook

Looking back at 1959, it is surprising to observe that in spite of some hangover ill effects from the recession of 1958 and the longest steel strike in the nation's history, the year is considered our best from an overall standpoint.

Now, with steel's labor problems made definite for another two years, good business in 1960 is almost a certainty, albeit it practically assures another round in the inflationary spiral. Since steel enters into the interests of all businesses and individuals, the effect of the settlement will be to spur the economy, even if it means higher wages, prices and cost of living. This last may rise as much as 2 percent this year. Steel price increases of about 3 percent, or $4.50 a ton are being discussed.

While a general rise in business of 6 percent is anticipated in 1960, all lines will not be up. Automotive sales should be up over 15 percent and those for many types of machinery are expected to increase 10 to 15 percent, but housing will be down about 10 percent. Tight money will be something of a brake on expansion and credit buying, with interest rates higher than now.

Stocks of steel are low and will remain so through the first half, since there won't be enough to go around. Inventory building will be pushed and expenditures for new plant and equipment will expand. Inventories will rise between 5 and 10 billion dollars and investment in new plant and equipment will amount to over 30 billion dollars.

However, steel isn't the only factor in the rise in business activity. Personal income will reach a new high and the public's appetite for electric appliances appears unabated, with an increase in factory sales of 3 percent expected this year — to a total of $23 billion. New buildings and the modernization of old in 1960 will cost an estimated 10 billion dollars for electrical contracting and materials.

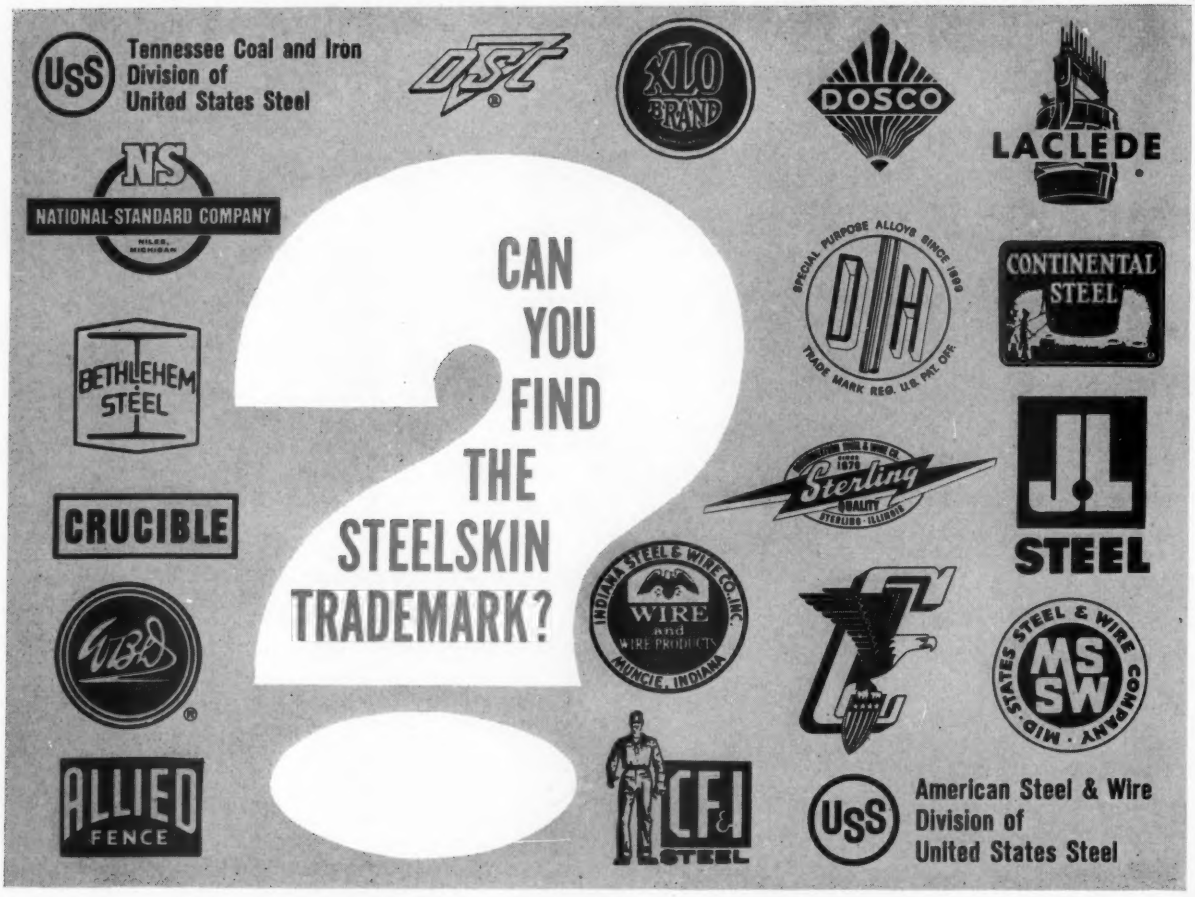
The outlook for aluminum is promising. While 1959 was a good year, producers look for an increase of around 15 percent. Somewhat over 2 million tons were shipped last year. Electric wire and cable manufacturers, the country's largest copper consumers, are wondering where their copper will come from. Stocks of electrolytic wire bars have been dwindling due to strikes among the basic producers. Some of these have been settled, but the gap between supply and demand has not been filled. The brass mills' stocks of both copper and scrap are somewhat better.

Manufacturers of copper and aluminum conductors nevertheless see a good year ahead and anticipate an increase in dollar volume of around 10 percent.

Shipments of rods and wire are increasing and the orders from auto makers for wire products are becoming steadily better. Wire rod shipments are on a basis of three to five months delivery. Merchant wire product demand is fairly easy, but soon will be increasing. Wire drawing operations are generally higher, limited somewhat by lack of rods. Demand for manufacturers' wire is strong and many mills will be operating at capacity levels at least through June.

The sentiment of the consuming public is all-important. It presently is confident of the future and purse strings are not drawn tight. To keep it that way, our representation in Washington should see to it that strikes in the future are either eliminated or minimized. Union leaders, out of step with the times, must be made to have a sense of responsibility to the welfare of the nation — by law, if they are not willing to be statesmanlike in their thinking and actions.

Edmund Duval Sickels
EDITOR



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Properties of Resistance Cross-Wire Welds In Stainless Steel Wire

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This study takes into consideration such factors as wire condition, grade, size and welding conditions, and correlates them to enable welds to be made that will have satisfactory strength and appearance.

Introduction

Little information can be found in the literature on resistance cross-wire projection or spot welding of stainless steel to make welds of optimum strength and appearance. This scarcity of data does not imply a lack of interest or need. Some fabricators of stainless steel wire articles have devised their welding procedure using hit-or-miss methods, while others have attempted a more methodical development of good welding practice. However, the pressure of production in most cases has prevented a thorough study by the manufacturer of the conditions that require consideration in contriving the best welding practice.

* * *

The present investigation covers a systematic study of the influence of the variables encountered in material and in welding practice on the strength, appearance, and corrosion resistance of cross-wire spot welds.

* * *

Cross-wire welding is actually a "projection" welding operation, even though it is generally referred to as "spot" welding. The variables commonly considered in this form of resistance welding are: (1) time, which is the duration of flow of welding current and is measured in cycles of a 60-cycle alternating current, (2) current, which is measured in amperes, (3) pressure, which is the force in pounds exerted by the electrode tips on the crossed wires, and (4) mutual indentation, sometimes called setdown, expressed as the percentage which each wire indents the other as a result of the welding operations.

How Tests Were Carried Out

Cross-wire welded specimens for this project were made on a 60 KVA size transformer-powered, press-type resistance welding machine. The strength of cross-wire weld joints was determined by making tension tests with a special fixture. Specimens were made in quintuplet; therefore, all tensile values reported herein represent an average of five tensile test results.

* * *

Corrosion resistance of cross-wire weld specimens was limited to a determination of the extent of carbide precipitation by means of the intergranular corrosion test (ASTM A240-44). Attack by the acidified copper sulfate solution in the 72-hour test period was measured by tensile testing welded cross-wire corrosion tested specimens and comparing the results with those of a duplicate set of specimens on which the corrosion test was omitted.

* * *

Materials selected for testing were Types 304 and 430. These grades were tested in three wire sizes, 1/8", 5/32" and 1/4" diameter round, to note the influence of wire size upon weld strength. The Type 304 wire in 1/4" diameter round was tested for weld strength at four different levels of tensile strength or "temper" introduced by cold drawing varying amounts after the last anneal. Type 430 was tested at two levels of tensile strength in 1/4" size. Limited work was done on Type 430 Ti in 5/32" diameter round wire. Because a few wire articles use both Type 304 and Type 430 in fabrication, some work was conducted on dissimilar cross-wire

TABLE I

Analyses of Materials Used in Study of Cross-Wire Weld Strength

Type No.	Heat	Wire Size Diameter	Ladle Analysis C	Mn	P	S	Si	Cr	Ni	Ti
304	40705	1/8"	.045	1.26	.025	.013	.63	18.19	8.65	-
302	38686	5/32"	.089	1.15	.026	.009	.69	18.43	8.48	-
304	60416	1/4"	.064	1.28	.024	.015	.53	18.41	8.88	-
304	56424	1/4"	.047	.65	.027	.010	.62	17.92	8.95	-
430	56424	1/8"	.069	.40	.021	.018	.41	16.89	.19	-
430	62276	5/32"	.055	.33	.024	.019	.41	17.41	.23	-
430	57318	1/4"	.066	.40	.015	.020	.51	17.09	.17	.28

TABLE II

Effect of Wire Condition on Tensile Strength of Cross-Wire Welds in 1/4" Round Types 304 and 430 Stainless Steels

Type Steel	Heat No.	Wire Condition	Tensile Strength of Wire	Tensile Break Load of Cross-Wire Weld
304	60416	Cold Reduced 8%	105,000 psi	5020 lbs.
304	"	" " 25%	118,000 psi	5280 lbs.
304	"	" " 35%	140,000 psi	5110 lbs.
304	"	" " 49%	161,000 psi	5770 lbs.
430	57318	Annealed	70,000 psi	3140 lbs.
430	"	Cold Drawn	90,000 psi	3470 lbs.

weld joints between Types 304 and 430. The compositions of all the materials used in this investigation are shown in Table I.

Discussion of Results

Effect of Wire Condition on Cross-Wire Weld Strength

To determine what effect the condition of the wire exerts on the strength of cross-wire welds, a series of tests were made using 1/4" ϕ type 304 material that had been hardened to different degrees by cold work. Cross-wire welds were made using material from each of four strength levels. Similar strength tests were conducted on welds made in two conditions of Type 430 wire, annealed and cold drawn.

* * *

Properties of the wires used in making these weld tests, and strengths of welds made from them are listed in Table II.

* * *

Selection of a welding schedule for this series of tests was based on the principle of short times and high currents and did not result in maximum strength values; however, all welding conditions were carefully duplicated for each group of samples to obtain comparable values. All welds made under similar conditions were found to have the same tensile strength regardless of the strength or "temper" of the wire used to make the weld.

Effect of Welding Times and Mutual Indentation on Cross-Wire Weld Strength

A group of test welds in 1/4" ϕ wires made with four cycles of current and covering a range of mutual indentations from 10 to 50% were compared to a second group made with 30 cycles of current. The general increase in tensile strength noted with the longer welding times prompted the preparation of two additional sets using intermediate welding times of 10 and 20 cycles. The tensile values obtained were plotted on a chart as break-load versus mutual indentation. Maximum tensile strength was obtained with 30 cycles of current at 30% mutual indentation as shown in Figs. 1 and 2. Figures 3 to 6 also confirm the trend toward higher strengths when 30 cycles of welding current are used.

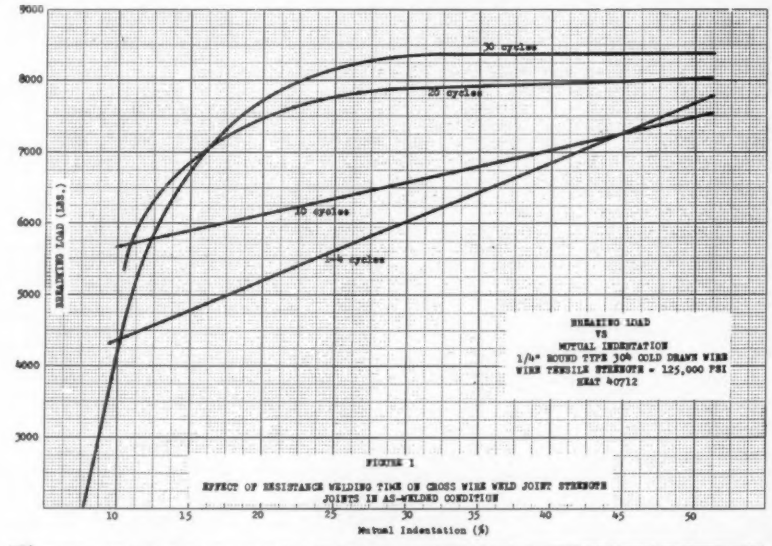


FIGURE 1

EFFECT OF RESISTANCE WELDING TIME ON CROSS WIRE WELD JOINT STRENGTH
JOINTS IN AS-WELDED CONDITION

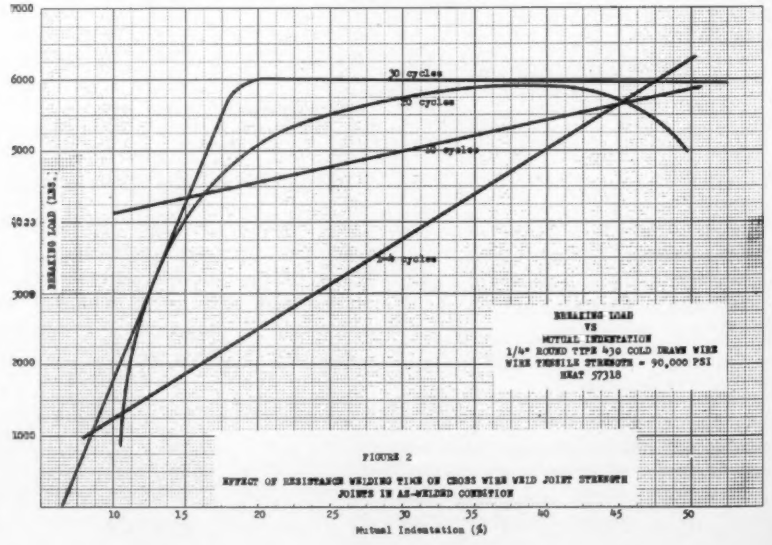
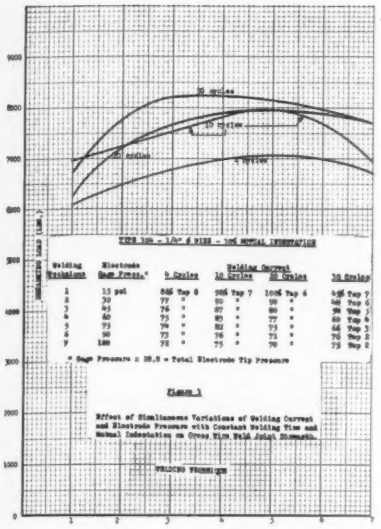
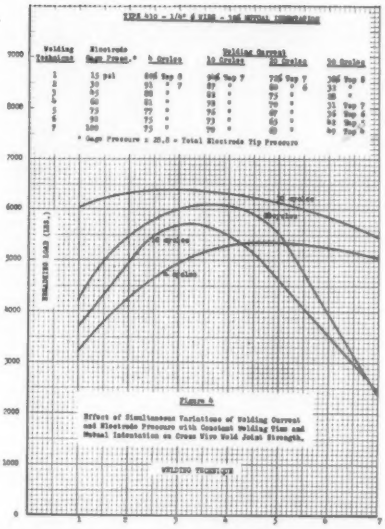
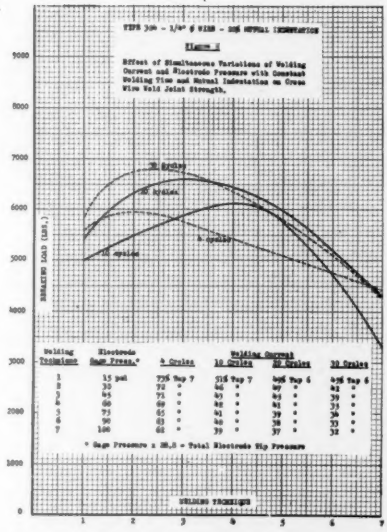


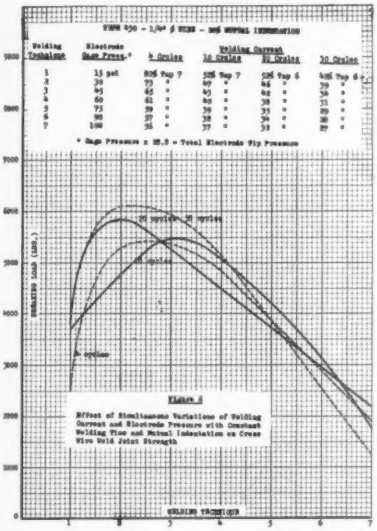
FIGURE 2

EFFECT OF RESISTANCE WELDING TIME ON CROSS WIRE WELD JOINT STRENGTH
JOINTS IN AS-WELDED CONDITION



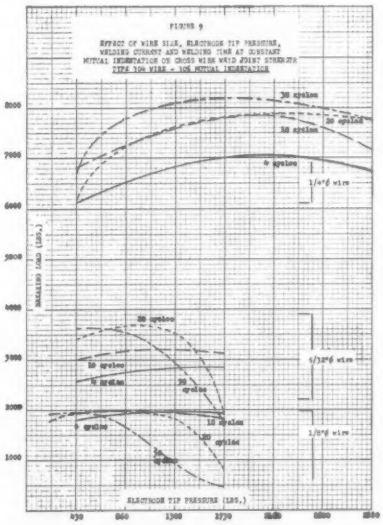






Effect of Welding Pressures and Currents on Cross-Wire Weld-Strength

The effect of the two remaining variables, welding pressure and current, was obtained by conducting a series of tests starting with low tip pressures and high currents and progressively increasing pressure with a corresponding reduction in current until a high tip pressure and low current combination was reached. A series of tests in $\frac{1}{4}''\phi$ wire were conducted for each of four welding times. The tensile values obtained were plotted as break-load vs. each pressure-current combination. Figures 3 and 4 illustrate the effect of using the proper pressure in conjunction with the necessary current tc give a desired mutual indentation. Results from similar tests with $5/32''\phi$ and $\frac{1}{8}''\phi$ wires are shown in Figs. 9 and 10. Welding pressures required to give maximum strength were found to vary proportionately to the size wire being welded.

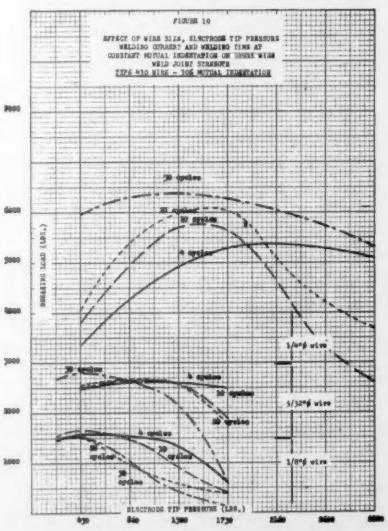


Effect of Welding Techniques on Appearance of Cross-Wire Welds

The appearance of the flash on cross-wire welds having maximum strength is generally not desirable, being rather sharp and ragged. Work aimed at improving weld flash appearance was conducted in the field of lower mutual indentations and shorter welding times. Figures 5 and 6 show that only a moderate loss in strength is incurred in welds having mutual indentations of 20%, made with four cycles of welding time, and 600 pounds tip pressure. On the photographs in Figs. 7 and 8 it can readily be seen that welds made under these same conditions have the best appearance or a minimum of weld flash.

Resistance of Cross-Wire Welds to Intergranular Corrosive Attack

Duplicate sets of cross-wire welds were prepared in both Types 304 and 430 stainless. One set of welds was subjected to the ASTM Test 240-44 (boiling acidified copper sulfate solution). Both the corrosion-tested samples and the unexposed duplicates were tensile tested. A reduction in break load (tensile strength) was considered indicative of a corrosive attack. Welds in Type 304 stainless were not subject to a loss in strength as a result of the corrosive exposure, while welds in Type 430 stainless



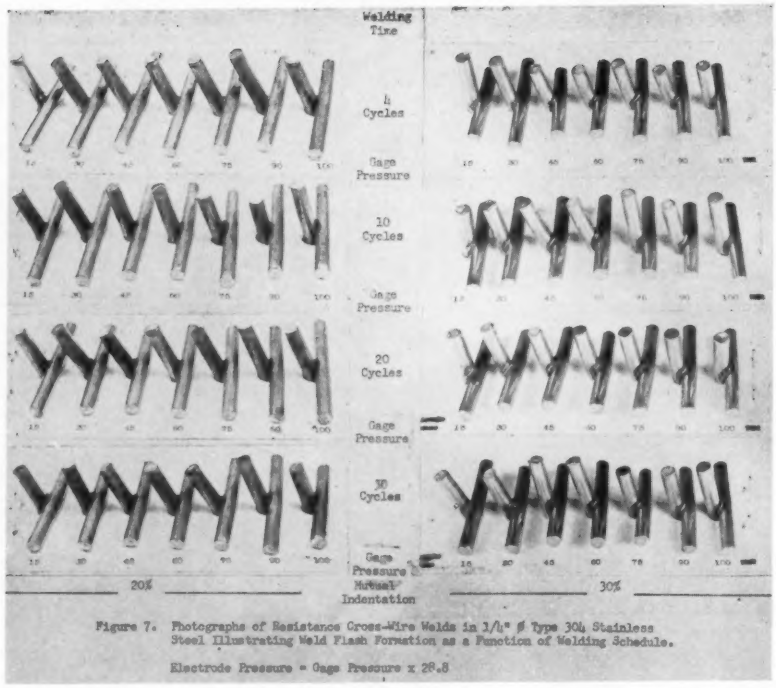


Figure 7. Photographs of Resistance Cross-Wire Welds in 1/4" ϕ Type 304 Stainless Steel Illustrating Weld Flash Formation as a Function of Welding Schedule.

Electrode Pressure = Gage Pressure x 28.8

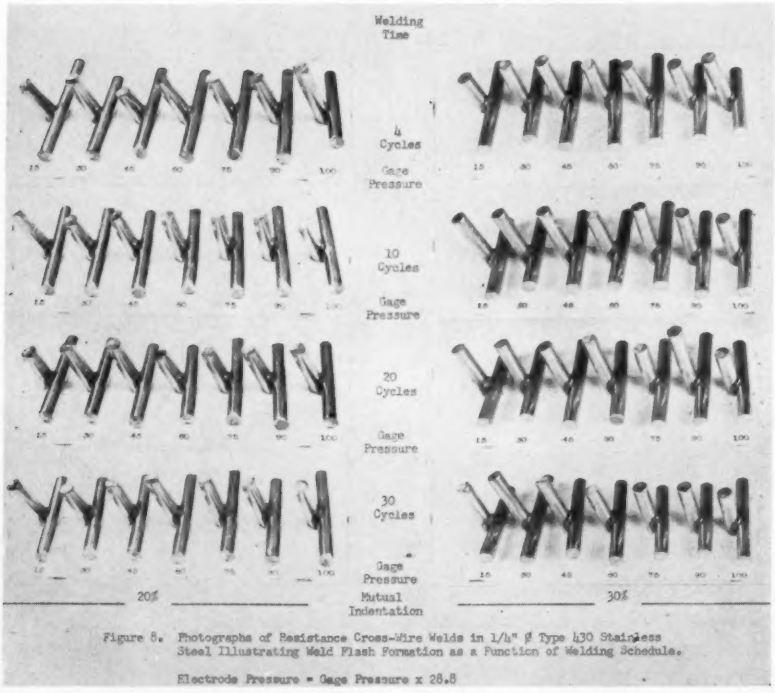


Figure 8. Photographs of Resistance Cross-Wire Welds in 1/4" ϕ Type 430 Stainless Steel Illustrating Weld Flash Formation as a Function of Welding Schedule.

Electrode Pressure = Gage Pressure x 28.8

were corroded to the extent that a loss of 10% in tensile strength occurred.

Dissimilar Grades of Stainless in Cross-Wire Welds

In some fabricated items it becomes necessary to weld Type 430 wire to Type 304 wire. A series of dissimilar welds such as these were prepared in 1/4" round using 30% mutual indentations for the purpose of obtaining properties. Fig. 11A illustrates that trends obtained approximated those made with like wires in that longer welding times resulted in higher strengths; however, the maximum tensile strength was slightly less than that obtained in Type 430 cross-wire welds.

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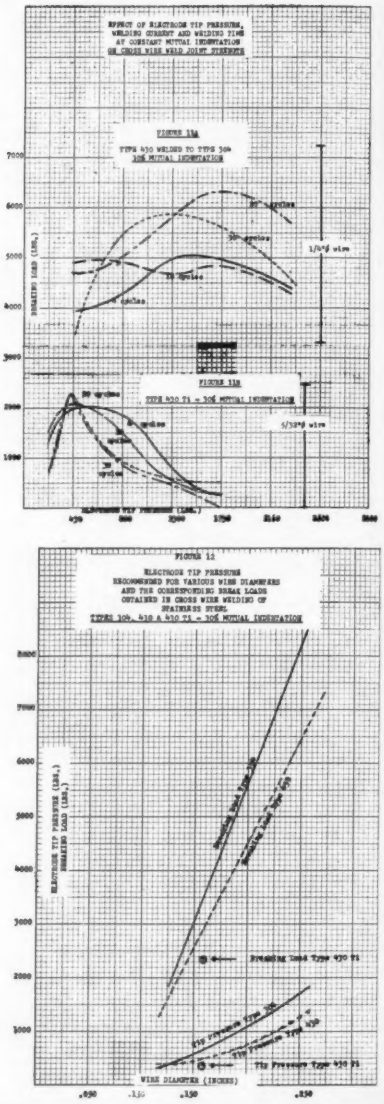


Test Welds Using Type 430 Ti Stainless Steel Wire

In view of the somewhat sporadic interest in Type 430 Ti stainless steel as a replacement for Type 430 in welding applications in this country, a series of tests with 5/32" ϕ wire were conducted. Fig. 11B illustrates the results obtained using a range of pressures, currents and times. Tensile strengths were approximately 500# per weld below those obtained with Type 430. Electrode tip pressures required for 30% mutual indentation were generally much less than those required for the Type 430 grade. Most all welds tested had peculiar saddle-like fractures, indicating little, if any, recrystallization across the weld faces.

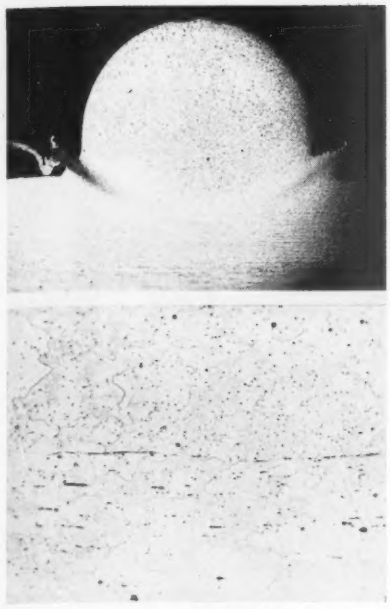


Fig. 13A (Top); Fig. 13B (Bottom) * * *

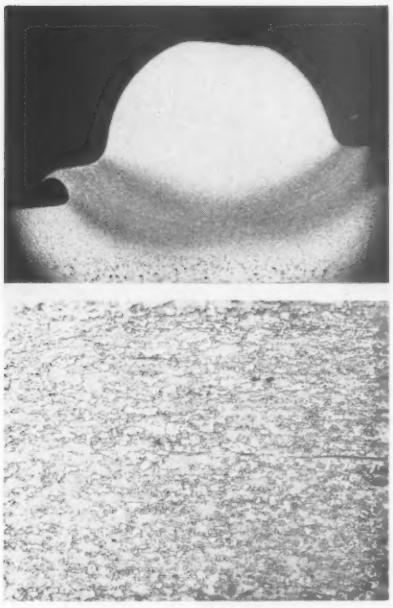


Fig. 14A (Top); Fig. 14B (Bottom) * * *

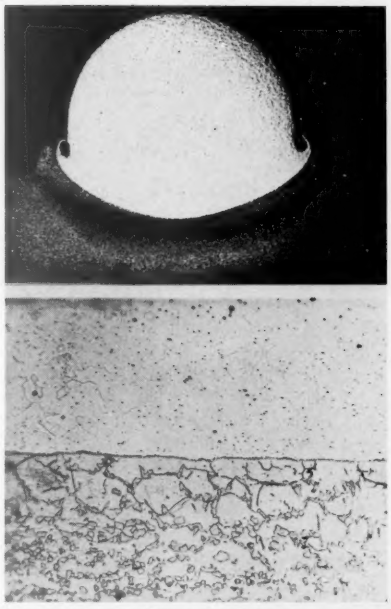


Fig. 15A (Top); Fig. 15B (Bottom) * * *

Metallurgical Structures of Cross-Wire Welds

Because of the unusual nature of fractures obtained when tensile testing dissimilar cross-wire welds, it was decided to conduct a metallographic examination of welds in each grade representing a reasonable range of welding conditions. Little or no evidence of cast structure was present in any of the welds. In the Types 304 (Fig. 13) and 430 (Fig. 14) welds, considerable recrystallization (solid phase welding) was found at the weld interface. In the dissimilar welds (Fig. 15) a very sharp thin line of demarcation was found at the interface. No recrystallization was evident on these welds.

Summary and Conclusions

1. When Types 304 and 430 stainless steel wire of varying tensile strengths were employed in making resistance cross - wire welds, no significant change in weld strength was found to occur. All welds made under similar conditions were found to have essentially the same tensile strength regardless of the wire strength used to make the weld, as shown in Table II.

* * *

2. Maximum tensile strength of cross-wire welds in the three wire sizes (1/4", 5/32", and 1/8" ϕ) of Types 304 and 430 were obtained with the higher welding times of 20 and 30 cycles.

* * *

3. A spread of mutual indentations from 10 to 50% showed that maximum strength of welds was obtained at 30%. A leveling off of tensile strength was noted for mutual indentations above 30%.

* * *

4. The welding pressure required to give maximum tensile srength was found to vary proportionately to the size of wire being welded. For 1/4" ϕ wire in Types 430 and 304 a tip pressure of approximately 1400 pounds gave optimum results. For 5/32" ϕ and 1/8" ϕ wires, tip pressures of approximately 700 pounds and 400 pounds, respectively, gave the higher weld strengths.

* * *

5. The heavy flash normally found in cross-wire welds of maximum strength can be reduced by using a mutual indentation of 20% and 4 cycles of welding time resulting in a moderate loss of strength. In 1/4" ϕ Type 304 stainless the corresponding loss of strength was from 8300 pounds to 6000 pounds, and for Type 430 from 6400 pounds to 5400 pounds.

* * *

6. Cross-wire welds in Type 304 stainless are not subject to intergranular corrosion as indicated by no loss in tensile strength after being subjected to the boiling acidified copper sulfate test (ASTM 240-44). Similar welds in Type 430 stainless were subject to intergranular corrosion in this media, as shown by a 10% loss in tensile strength after exposure.

* * *

7. Dissimilar cross-wire welds made between Types 430 and 304 stainless had properties approximating those welds made with like wires in that longer welding times resulted in higher strengths; however, the maximum tensile strength was slightly less than that obtained in Type 430 cross-wire welds.

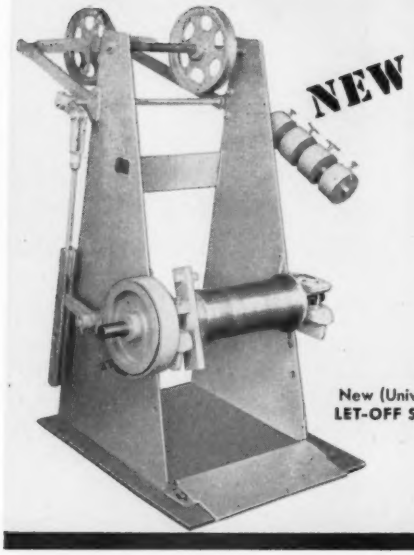
* * *

8. Cross-wire welds in Type 430 Ti stainless steel had tensile strengths approximately 500 pounds per weld below those obtained with Type 430. Maximum tensile strength occurred in this grade when electrode tip pressures of 400 pounds for a 5/32" round wire were used. Most welds that were tensile tested had a peculiar saddle-like fracture, indicating little, if any, melting or recrystallization across the weld faces.

* * *

9. Metallographic examination of weld interfaces showed little or no cast structure to be present on any of the welds. In the Type 430

(*Please turn to page* 244)



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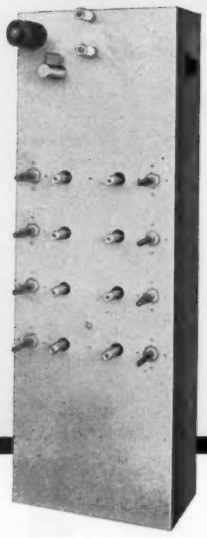

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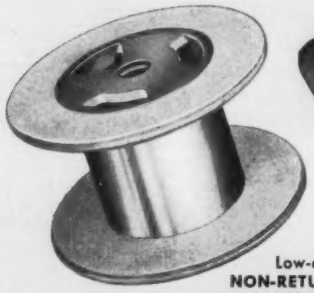

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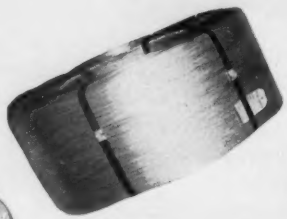

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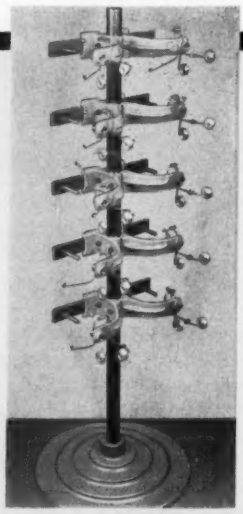

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Wire Braiding

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This very complete treatise on wire braiding is published through the courtesy of the author's company, for whom it was originally prepared.

Whereas hand plaiting or braiding had been in use for hundreds of years, the mechanical plaiter or braiding machine is of comparatively recent origin.

* * *

The first records of patents concerning a braiding machine were issued to **Thomas Walford** (Manchester) in the year 1748.

* * *

Most of the early braiders were hand operated and although crudely made and constructed almost entirely of wood it was possible for an expert operator to produce some very fine examples of braid.

* * *

Considering for a moment the nature of braid it will be apparent from the diagrams in Fig. 1 that the finished yarn pattern takes the form of a diagonal weave.

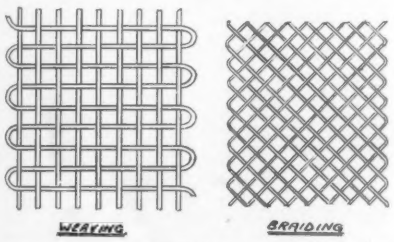


Fig. 1—Yarn Pattern Takes Diagonal Weave.

There are in general use today three basic types of braiding machine and before considering some of the many problems associated with wire or metallic braiding a short description of these machines and the work produced is given below: —

1. **Flat Maypole. Used for the manufacture of lace, ornamental braids, elastic, and non-elastic tapes, shoelaces, and, in more recent years, for flexible metallic pigtails, conductor ground strips, etc.**
2. **Tubular Maypole. Used largely for cords, fishing lines, shoe-laces, hoses, cable and wire covering. With the making of hoses, yarns and high tensile steel wires are braided in successive layers to give combined strength and flexibility. In cable making, too, an outer wire braided sheath is provided for electrical shielding purposes with certain types of cable.**
3. **High Speed Tubular Rotary Braiders. Used mainly for cords, hoses, cable and wire covering and certain styles of shoe-lace. These braiders are the outcome of the modern quest for speed, working from two and a half to three times as fast as the Maypole counterpart.**

* * *

With the two types of Maypole machine a certain amount of confusion is persistently encountered regarding the difference between a flat and a tubular braider, partly because at a glance the machines appear to be identical. Close examination, however, will reveal that the main differences are in tracking and take-up arrangements. As seen in Fig. 2, the tracking for the tubular braider consists of two serpent-like paths intersecting at regular distances with half the carriers in one track travelling in one direction and half the carriers in the other track going in the opposite direction. With

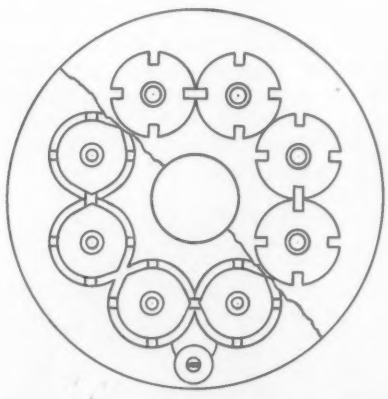


Fig. 2—Horngears and Track for Tubular Braider.

flat braiders, however, the carriers do not make a complete circuit. Instead of two separate tracks we have one complete serpent-like track with intersections. At each end of this track there are terminal gears and when a carrier reaches one of these gears the carrier direction is reversed and it proceeds in the opposite direction until it reaches the terminal gear at the other end, when the reversing process is repeated. Take-up arrangements for a tubular braider usually take the form of a capstan or take-up sheave whereas a flat braider is generally equipped with a system of rollers to maintain the finished product in a perfectly flat condition.

* * *

Turning our attention to metallic or wire braiding we are immediately confronted with the question of spool winding. Evenly tensioned, multi-end spool winding is a formidable problem and it is only recently that any serious attention has been given to this very important operation.

* * *

One, two or three ends can be wound onto a single spool with reasonable results if care is taken, but when, as is often the case, there are five or more ends to contend with it becomes extremely difficult to obtain good results with normal winding gears. The term "end" is used to describe a single strand of wire irrespective of length.

* * *

Again the very nature of the wire being wound can cause trouble because there is a considerable difference between soft copper and high tensile steel wire.

* * *

Weight is another factor to be carefully considered for the simple reason that the spools used on a wire braider must of necessity be stoutly constructed

* * *

In the interest of good braiding all spools should be wound so that they are approximately equal in

weight. Braider carriers in most instances are specially designed to cope with the combined weights of spool and wire together with the somewhat erratic forces that come into play when the machine is working.

* * *

Some idea of the magnitude of the winding problem can be seen by carefully studying Figure 3.

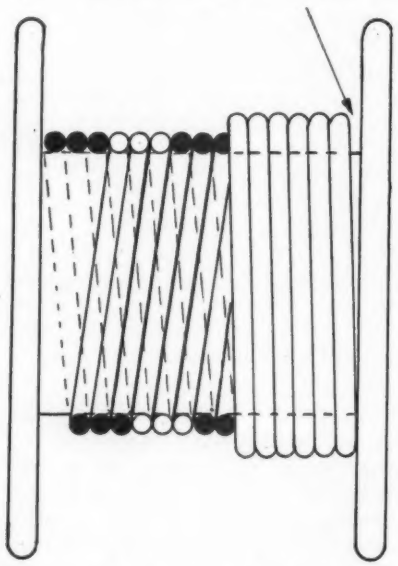


Figure 3 * * * * * * * * * * *

In fact, to be able to lay five ends of wire, **each of equal length,** side by side in uniform manner and to maintain perfect uniformity of position with each successive layer until the spool is filled, is impossible, because when the "ribbon" of wire comes to the end of the Bobbin it has to turn back, which makes the inner wires "cockle". In practice, this phenomenon will cause unavoidable looseness of the inner wires of the ribbon at the point that the helix changes direction. Nevertheless, it is quite possible to obtain good results with carefully designed winding machines, good spools and, last but not least, a reasonably intelligent operator.

* * *

Extreme care is necessary when commencing to wind a spool of wire because if, as is often the case, snarls or crossed wires are made with the first few turns on the barrel of the spool it will become well nigh impossible to complete the fully wound spool in a satisfactory manner. Quite often an inexperienced operator will tie the ends of wire on to the spool barrel in a crude fashion and inevitably the slight hump produced in doing so will cause uneven winding.

* * *

In addition the winding gear should be designed for gradual acceleration in starting. A rapid start or any tendency to snatch will give trouble — in the case of fine wires it may cause breakages.

* * *

Equally important is the condition of both the braider spools and the supply reels or let-off reels.

* * *

It is virtually impossible to obtain good winding with a damaged spool or even a spool that does not run perfectly true. When one considers that in some cases the combined weight of a single fully charged let-off spool will be in the region of 100 lbs. it is not difficult to envisage poor results with a batch of let-off reels that either do not run true or are of unequal overall weight.

* * *

It is sometimes possible to ignore some of the lesser faults in winding such as a slack or riding wire because during the braiding process slight variations or faults are often eliminated but nevertheless it is much preferred to keep any faults of this nature to an absolute minimum during winding process.

* * *

Commendable and entirely successful efforts to eliminate wire winding difficulties are embodied in the recently designed multi-end wire winding machine produced by James Day (Machinery) Limited. (See Fig. 3a)

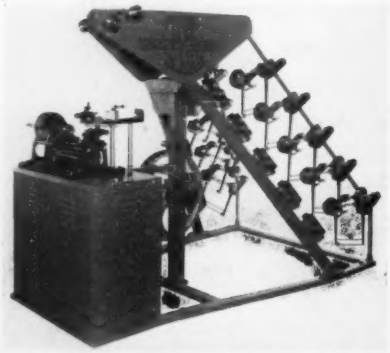


Fig. 3a—Multi-end Wire Winding Machine—Courtesy of James Day (Machinery) Ltd. *

Known as the "Ensor" winder and named after the designer this machine, which is both novel and unconventional, represents a definite advance in the technique of multi-end wire winding.

* * *

Another interesting machine is that produced by W. & M. Ostermann for the same purpose i.e. improved winding for wire braider spools.

* * *

By far the largest majority of braiding machines used for producing metallic braids are of the Maypole type although they are of necessity far more robustly constructed and slower running than similar machines used for yarns. Fig. 4 shows a typical heavy duty wire braider.

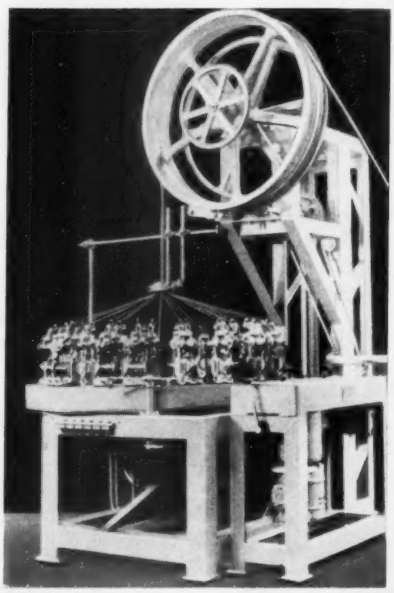


Fig. 4—Typical Heavy Duty Wire Braider—Courtesy of W. & M. Osterman. * * * *

Whereas cotton or yarn spools can usually be considered in ounces weight wire spools and the contents are normally reckoned in pounds and it is not difficult to understand why this type of braider has to be solidly constructed.

* * *

Running speeds of wire braiders should be varied to suit circumstances although in most cases speed is limited to a little above half of that of a yarn braider of similar proportions. It is, of course, quite possible to wire braid with a yarn braider running at reduced speed but the quality of the finished product is definitely in-

ferior to braid made on a well designed wire braider.

* * *

Subject to good spool winding and careful adjustment it is also possible to produce certain classes of wire braid on high speed rotary machines running at reduced speeds.

* * *

Carriers used in the majority of present day wire machines are of necessity rigidly built and in most instances the pay-out spools are mounted horizontally in the carrier. Unfortunately, this restricts the wire carrying capacity of the spools and is a decided disadvantage when long lengths of braid have to be produced because of the increased number of joins due to spools running out.

* * *

A departure from conventional carrier design is to be seen in the latest "Mosspeed" wire carrier (Fig. 5.). Robustly constructed and cleanly designed this carrier which is of Amercian origin manufactured by Mossberg Pressed Steel Corp. works with a vertically mounted wire spool that can accommodate as much as 8½ lbs. of high tensile steel wire.

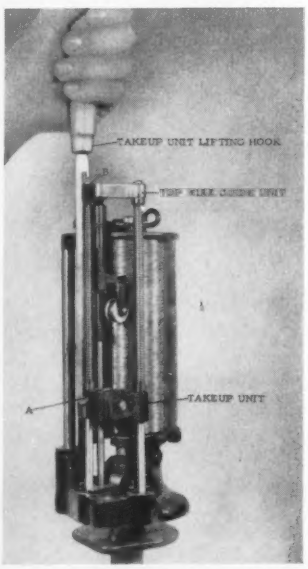


Fig. 5—Mosspeed Wire Carrier — Courtesy of Mossberg Pressed Steel Corp. * * * *

The makers of braiding machines, although relatively few in number, are all people with many years of experience in this particular sphere and although progress in design is by virtue of the peculiar nature of braiding somewhat slow, these manufacturers are forever seeking to improve on the performance of machines and carriers.

* * *

Two types of maypole braider carriers are in general use and whatever the type they have to perform the functions set out below with a minimum of trouble:—

1. **Carry the spool or cop of material.**
2. **Provide tensioning for the material.**
3. **Pay out the material evenly.**
4. **In the event of yarns or wire fouling or breaking to function in such a way as to stop the braider as quickly as possible.**

* * *

Where high class work is of paramount importance it is advisable to use a slow running machine equipped with the old style of gravity tensioned carriers.

* * *

Fig. 6. shows a typical old style wire carrier with tension maintained on the wire or wires by gravity. Tension is varied by increasing or decreasing the weight in the dropper which is in the form of a container performing the triple functions of maintaining the required tension, releasing the correct amount of wire and in the event of foul or broken wires this dropper operates the mechanism for stopping the machine. This type of carrier is seldom seen in the U.S.A. and is never used for wire braiding.

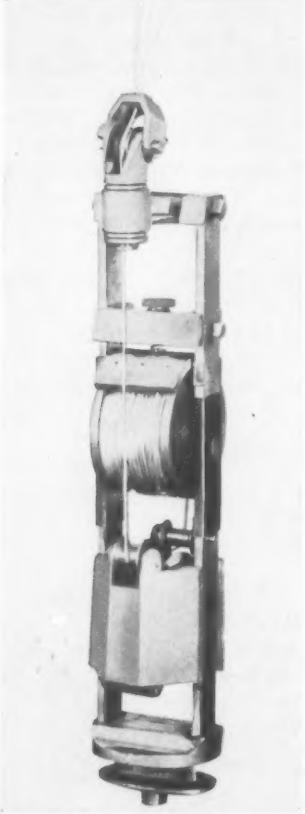


Fig. 6—Gravity Dropweight Carrier — Courtesy of B. & F. Carter. * * * * *

* * *

It should be observed also that the thread guides and thread eyes so familiar on yarn carriers have been eliminated and in their place we usually see large diameter V rollers. The reason for this change is twofold:—

1. **Wire lacks the flexibility normally associated with the vast majority of yarns.**
2. **It would be inadvisable to pull or bend wire around the small radii normally used on yarn carrier guides and thread eyes.**

* * *

Fig. 7. This is a modern spring tension carrier and it will be observed that compression springs operate the dropper which is no longer in the form of a container. Wire spools are fitted horizontally and supply release can either be

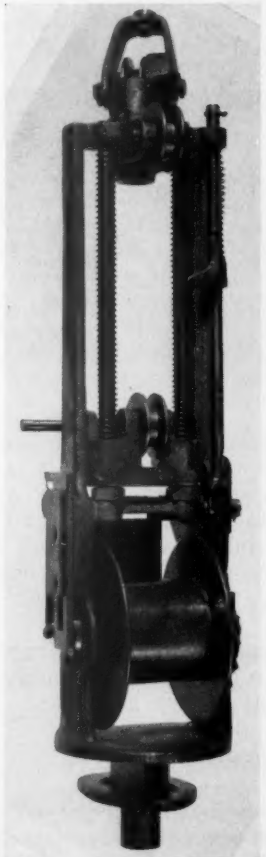


Fig. 7—Modern Spring Tension Carrier. *

by ratchet and pawl or friction brake. Tensioning can be varied by simply changing the springs which in most cases are readily accessible.

* * *

Whatever the style of carrier in use it is vitally important to maintain them in perfect working order and in a reasonably clean condition. Failure to do so can give rise to many puzzling and irritating difficulties during the braiding process.

* * *

A reasonable amount of running experience on the part of the operator can overcome some of these minor faults but nevertheless even with an expert operator it is not always possible to quickly locate a running fault when there are more often than not 36 or 48 or sometimes many more carriers to be examined.

* * *

Lubrication of the working parts of a carrier needs to be carried out with discretion—too much involves the risk of soiling the finished product—too little usually means a damaged or badly working carrier.

* * *

There now follows an example of what is a fairly common running difficulty associated with all types of braider. A 24 carrier braider stops for no apparent reason at odd intervals of time, sometimes running for 10 minutes, sometimes for an hour or even much longer. This effect is in the majority of instances caused by a badly wound spool of wire, non-uniform material or a faulty carrier.

* * *

Unless one is able to see the faulty spool or carrier it is more than likely every carrier will have to be thoroughly examined in turn, taking care to look for a faulty spool of wire as one proceeds.

* * *

A weak or fouled tension spring, a worn supply ratchet or a slightly bent or dry spool pin, any of these slight defects can cause trouble of this nature.

* * *

If, however, careful examination of spools and carriers is carried out and on setting the braider to work the intermittent stopping continues it is possible that a more insidious trouble is developing. This fault which is by no means rare after a machine has been in use for some time is a worn carrier track follower.

* * *

Most braider carriers will run for years, given reasonable care, but occasionally a carrier track follower will for some obscure reason be subject to rapid wear. When this happens the carrier base becomes excessively sloppy in the tracking and when the machine is working, C.F. (Centrifugal Force) will cant the base sufficiently to lightly knock the trip mechanism.

* * *

Normally there is a very small clearance between carrier bases and the knock out lever but should a carrier become abnormally sloppy in the tracking, it will knock the trip lever every time it passes and eventually the machine is brought to a standstill for no visible reason.

* * *

To locate a carrier that has become badly worn take hold of the top of the tension post of each carrier in turn and rock it sideways in the tracking. The offending carrier will usually be found to have considerably more side movement than the remainder. Once located, the worn carrier should be removed and a new one fitted.

* * *

Another method to determine whether or not there is a worn carrier is to carefully rest two fingers on the back of the stopping lever or bar when the machine is running. A slight knock will be felt every time the faulty carrier passes the trip lever. It is this continual knocking that eventually throws the trip lever and stops the braider at varying intervals of time.

* * *

Care should be exercised when using the second method and although it is possible to quickly detect a faulty carrier it will still be necessary to find out which is the offending carrier by examining each one in turn.

* * *

It is not possible to deal with many faults in this article except to say that correct diagnosis is important and sometimes this requires an immense amount of patience and methodical plodding before the correct solution to the trouble can be arrived at.

* * *

We now turn our attention to the vexing question of speed. For production people braiders can never run fast enough whereas the majority of intelligent operators will prefer to run the machines at an economical speed — maximum speed with a minimum of stoppages—and in most instances this maximum efficiency speed is generally from 5% to 10% below the recommended speed. The explanation for this is that usually a large number of machines are in use and it is not possible to devote sufficient time to maintain all of these machines in perfect condition.

* * *

For example, the recommended speed of a 24-carrier Maypole yarn braider is 40 convolutions per minute. This does not satisfy the production experts so the speed is increased to 45 convolutions per minute. Within a short time output is lowered, we have an inferior product and increased maintenance charges.

* * *

On the other hand, should the speed have been reduced by a few convolutions per minute, it would have been found beneficial in most cases, the machines needing less attention with output tending to increase.

* * *

In earlier times it was customary to set the braider running at the recommended speed and keep it running at the one speed regardless of the nature of the materials being braided.

* * *

Quite often the result would be an inferior product.

* * *

Nowadays, however, it is usual to find that braiding machines are equipped with the means to vary the speed to suit circumstances and materials.

High Speed Braiders on Wire

It is quite possible to manufac-

ture a limited range of wire braided products on high speed rotary braiders such as the "Guido Horn" or "Wardwellian" machines. Speed will have to be reduced accordingly but on the whole excellent results can be obtained provided the braiders are kept in first class condition.

* * *

Good spool winding is absolutely essential and some modifications to thread guides may be necessary.

* * *

Weights have to be studied with care and in the case of the "Wardwellian" it is recommended that the combined weight of a single carrier spool and wire should not exceed certain limits.

* * *

A point to be observed in connection with rapid braiders is that wire spools should be of approximately the same proportions in order to prevent undesirable out of balance effects when running.

* * *

Care should be taken when piecing up ends to lay the wire in the correct sequence at the braiding die. Failure to do this will cause an untidy snarl in the braiding.

* * *

It is not possible in an article of this nature to deal with more than one or two of the many problems that beset the producer of braid. A little patience and care are all that is required in many instances but it is essential to have a sound knowledge of the nature of the materials that are being processed. For instance, it would be unreasonable to change over from soft copper wire braid to high tensile steel wire braid and expect reasonable results without a considerable amount of adjustment both during the winding of carrier spools and the braiding operation.

* * *

All too frequently one is confronted with the problem of tight braiding, especially when fast machines are in use. The faster a braiding machine is worked the greater the tendency for centrifugal action to create harsh working and undesirable effects on carrier tensioning.

* * *

As a typical example let us consider a rubber covered cable with a soft copper braided sheath for electrical shielding. To produce a satisfactory braided cover it will be necessary to use fairly heavy carrier tensioning and this results in either the braid becoming embedded in the rubber sheath or in extreme cases the rubber will spew out between the interstices in the braid.

* * *

Apart from reducing the carrier tensions, and in the interest of good quality production this is not always desirable, there are two ways of minimizing the trouble. The first remedy is to considerably reduce the speed of the braider, an undertaking that will be extremely unpopular when considered from a production angle. With a fast running braider the effect of centrifugal force is quite often under estimated or ignored when using either yarns or wire. If, however, it is desirable to maintain normal running speed a braid softener device must be used.

* * *

The main disadvantage is that a special close fitting former will have to be fitted to suit the particular job in hand. To be successful the former, usually a highly polished and slightly tapered tube, must be fitted so that the braid will be made on the former. A slight up and down motion must be given to the former by using an inverted beater whereupon the braid will be pulled easily from the braiding centre by the combined action of the beater and the haul-off or take-up sheave.

* * *

The gentle oscillating motion of the beater tends to close and thereby loosen the braid on the former. In this condition the finished braid is easily pulled from the former before it has time to tighten up again under the action of the take-up sheave.

* * *

Very few braiding machines are equipped with beating mechanism unless specially asked for but an exception to this is the American high speed "Wardwellian" rapid braider which has a built in beater tube.

* * *

An extremely high standard of both spool winding and braiding is required when manufacturing high pressure hoses.

* * *

When it is considered that in many cases these hoses have to be made flexible, yet strong enough to resist bursting pressures of up to 50,000 lbs. per square inch it is not difficult to visualise the very exacting conditions that must prevail and be maintained during the processing.

* * *

Steel wire with a tensile strength of some 170 tons per square inch is sometimes used for this work, and to obtain good spool winding and perfect braiding with wire of this nature is no mean achievement.

* * *

It is also important to maintain the correct braiding angle during the processing and this in most cases is in the region of 55°.

* * *

Fig. 8 shows a modern hose braider control panel, the instrumentation of which enables the operator to maintain accurate control during the sheathing of these hoses.

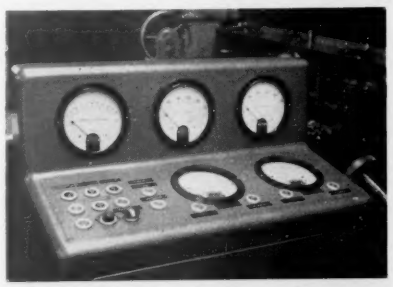


Fig. 8—Modern Hose Braider Control Panel.

Whereas the majority of tubular braids are manufactured on vertical machines it is general practice due to the rigid mandrels to sheath high pressure hoses on horizontal braiders.

* * *

The inner tube of the hose is put onto a mandrel normally about 50 ft. or more in length. Mandrel and tube are drawn through the braiding heads via a long endless chain haul-off. When the braiding has been completed the mandrel, tube and braided lining are given another coating of rubber by passing the sheathed tube through an extruder.

Following this the hose which is still on the mandrel is first vulcanised and then removed from the mandrel by air or water pressure.

* * *

Low pressure quality hoses are processed in much the same way although it should be noted that depending upon specification there are a number of different methods used.

* * *

Materials also vary and in some cases the hoses are not braided but instead they are lapped with cotton threads.

* * *

Turning to braid stitching there are several styles in general use. They are:

1. Diamond or Basket Weave	**1 : 1**
2. Standard	**2 : 2**
3. Hercules	**3 : 3**

* * *

These are known as symmetric stitches, the figures indicating one over and one under or two over and two under as the case may be.

* * *

Diamond or Standard stitching can be arranged for on Maypole machines by suitably arranging the relationship of the spool carriers.

* * *

In the case of high speed rotary braiders, however, deflectors must be fitted to suit whichever style of stitch is desired.

* * *

For Hercules stitching, three over and three under, it is necessary to use a different style of horngear but this type of stitch is not very often encountered.

* * *

It is also possible to produce a symmetric stiching such as 1:2 or 1:3, the figures indicating one over and under two or one over and under three.

* * *

Two methods of specifying the calibre of a braid are in general use:

1. **Calibre of wire or yarn which includes the gauge and number of ends together with the number of picks or stitches per inch of feed. This, of course, applies mainly to standard braids.**
2. **Tubular braids used for cable, wire covering or hoses are in many instances designated by the calibre of wire or yarn and the lay.**

* * *

The lay is defined as the distance travelled by the braided tube during a complete convolution or revolution of any one spool carrier.

* * *

Usually there is no objection to marking the start or the end of a braided cable for a few inches. In the case of yarns all that is necessary is to take a yarn (usually white or similar) from a single carrier and with a dirty finger and thumb smear the thread between the top of the carrier tension post and the braiding die or centre. Run the braider for a few inches of feed and the dirty yarn will clearly indicate the lay which can be readily measured with a rule.

* * *

For wire braid a slightly different procedure will have to be adopted for the simple reason that wire is not amenable to marking in the same way as yarn. For example, the lay on a sixteen carrier wire braider can be determined simply by laying a rule on and parallel with the braided sheath. The lay can then be measured by the pitch distance between eight wires laid on in the same direction. (See Fig. 9)

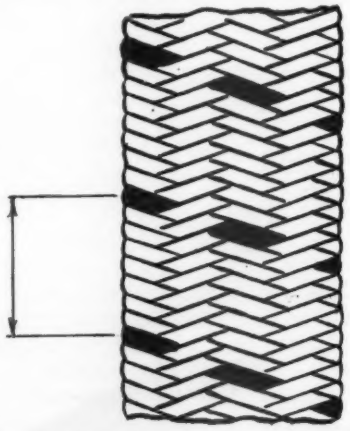


Fig. 9—Indication of Lay and Pitch Distance Between 8 Wires.

* * * * * * * *

If so desired the first method (number of picks or stitches per inch of feed) can be used for all types of standard braid.

* * *

Unfortunately the use of the lay does not convey fully the nature of the braided cover and to obtain a certain desired coverage involves the use of somewhat elaborate formulae or as is more often than not the case a procedure of trial and error.

* * *

It has been previously stated that it is possible to wire braid on a yarn machine. If reasonable results are desired four important observations should be noted: —

1. **Carriers must be in perfect condition.**
2. **Speed must be reduced.**
3. **Spools of wire must be correctly positioned on the carrier and winding must be extremely good.**
4. **Work must be suitable for relatively light tensioning.**

* * *

Fig. 10 shows the most convenient way of arranging spools of wire on a typical yarn braider.

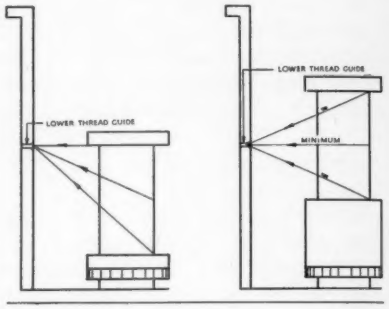


Fig. 10—Arrangement of Wire Spools on Braider — Poor at Left, Correct at Right.

Careful winding and a reasonably short traverse length are a necessity if good results are desired.

* * *

What is important, however, is that the wire spools should be mounted on the carrier so that the centre of the winding is in line with the lower thread guide on the carrier tension post.

* * *

Only when this rule is observed does it become possible to minimise erratic pay-out at each end of the traverse.

* * *

To sum up it makes quite an appreciable difference to results if attention is given to what appear to be insignificant details.

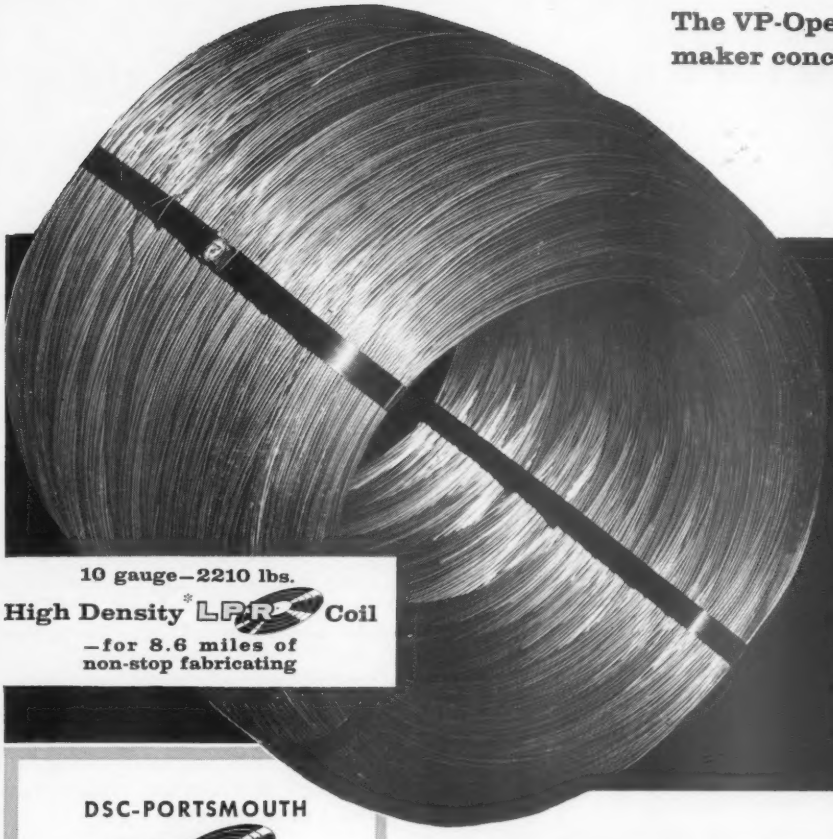
* * *

Often enough a perfectly good braiding machine is described as a nuisance solely because of maladjustments or careless handling on the part of the operator.

(*Please turn to page* 245)

The VP-Operations of a big mattress maker concluded:

*"With *LPR Coils we need set up just once vs. 10 to 15 times with Traditional Size Bundles"*



10 gauge—2210 lbs.
High Density *LPR Coil
—for 8.6 miles of non-stop fabricating

How a Brite Wire User Sold Himself

DSC-PORTSMOUTH
*LPR
CONTINUOUS LENGTH BRIGHT WIRE COILS

LOW AND MEDIUM CARBON
.072″/.500″ inc. (to about 4200 lbs.)
.023″/.071″ inc. (to about 1000 lbs.)

HIGH CARBON
.072″/.250″ inc. (up to about 4200 lbs.)
.023″/.071″ inc. (up to about 1000 lbs.)

COIL DIMENSIONS ON REQUEST

●

*A DSC TRADE-MARK

Dyed-In-The Wool Small Coil User

A nationally known mattress maker bought Spring Wire and also Low Carbon Basic Wire in 150 to 200 pound coils. Would he change to bigger coils? Never!

Then an Eye-Opening Visit

Finally a DSC Customer Rep persuaded the Purchasing Agent to arrange for as many officials as he pleased to visit our Portsmouth Division Rod and Wire Mill. They came—the VP-Operations, the Plant Manager and his Assistant, and the Assistant Purchasing Agent.

A First Step Toward Cost-Saving

The visitors were conducted through the mill, shown how their wire was drawn in 1200 pound coils which then had to be split into 150 to 200 pound bundles. The visitors conceded they ought to use standard 300 pound bundles "as a starter to cut setup time." *Their* words, not ours.

A Further Step in the Right Direction

After they had watched our big *LPR's going into Welded Wire Fabric, we showed them about 12,000 pounds of No. 3 Brite Border Wire which had been drawn for them, and was ready for splitting into 60 to 80 small bundles. They caught on—instructing us to change their order to 2,000 pound coils. Next day we shipped them 6 coils weighing 12,055 pounds.

The Visitors Sold Themselves on *LPR's

Next they spotted a lot of Spring Wire in 2500 to 3000 pound *LPR's ready for shipment to another customer. Said the VP-Operations, buttonholing his Plant Manager, "For every time this *LPR user sets up, we have to stop work and set up 10 to 15 times!" Turning to Uno Johnson, our Rod and Wire Mill Superintendent, he remarked, grinning, "We're sold. Ship us a 2,000 pound *LPR of 10½ gauge Spring Wire so we can start preparing ourselves for handling up to 3,000 pound coils."

How About Looking Into *LPR's Yourself?

*LPR's cost no more per pound than traditional mill weight coils. Actually they cost less considering how they help cut your fabricating costs, coil-end scrap loss, materials-handling expense, etc.

For complete information about *LPR's or about visiting our mill, just call your nearest DSC Customer Rep or write to Detroit Steel Corporation, Box 4308, Detroit 9, Michigan.

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Small Diameter Power and Control Cables

by Maurice M. Gilbert
Senior Electrical Engineer
Polychemicals Department
E. I. du Pont de Nemours & Co. Inc.
Wilmington, Delaware

A paper presented at the Annual Convention of The Wire Association on October 14, 1959, at Cleveland, Ohio.

This paper is intended to present some of the problems in providing safe, reliable and at the same time economical small diameter power and control wiring in today's automated plants. We don't propose that the solution arrived at in this paper is the only one; it has, however, worked very successfully and we present it for your consideration.

Control Cables

The need for improvement in instrument and control wiring became evident 8-10 years ago. However, it has only been within the last 4-5 years that serious effort was made to provide wire insulation suitable for our modern automated plants. As you all know the newer automated plants are usually operated from central control rooms; process conditions being sensed and controlled by means of electrical signals. The more complicated and automated the process the more the plant was dependent on adequate control wiring.

* * *

Less than 10 years ago very few central control rooms existed. Most of the control consisted of motor push-button leads. Some interlocking existed but it was usually confined to simple limit switches and direct motor sequence control. The wire was usually rubber-insulated, neoprene-jacketed, single-conductor in conduit. This type of construction, while of high quality, was expensive and space-consuming.

* * *

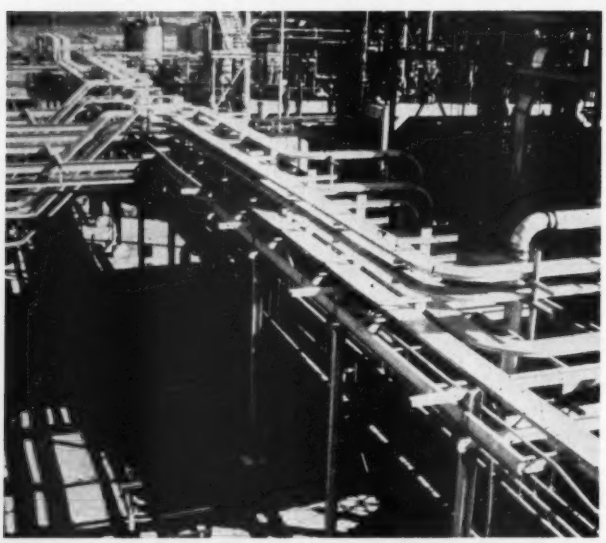
The newer completely automated plants require a central control room where signals from all process variable are brought, to be used for closing the control loop through computers, as well as record purposes. Literally hundreds of circuits are required between the central control room and the process area. These electrical signals are used to measure speed, pressure, temperature, level, flow ratios, etc. Electric signals are also sent from the control room to the process area to start and stop motors, change speed, open and close valves, operate safety devices, and control almost all process conditions.

* * *

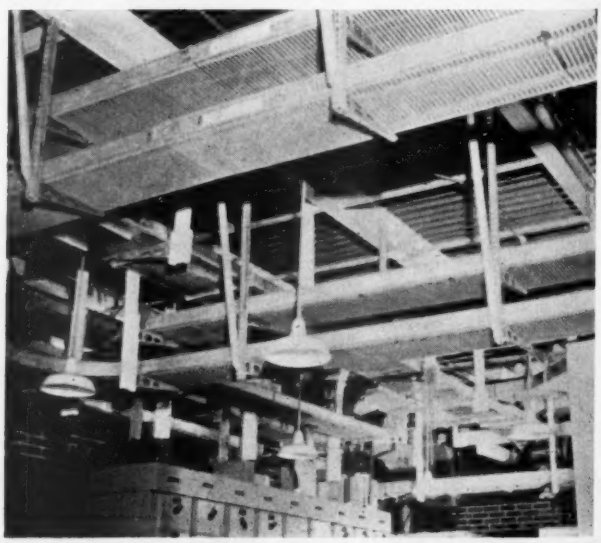
In a completely automated plant the reliability of control and signal wiring is imperative. While the older style insulation systems were excellent for their intended purpose, improvements were necessary both in toughness and resistance to environmental conditions. As the size of the automated plants grew, more and more space was taken up by the conduit and wiring system. Some method had to be found to reduce these spare requirements and at the same time improve the overall reliability of the wiring system.

* * *

The term miniaturization is becoming almost as common as the word automation. However, very few people associate it with instrument and control cable construction. Some thought has been given to this by electronic manufacturers; however, their approach has been to reduce conductor diameter. This has not always been successful and has resulted in broken wires and insuf-



Outside view of tray system. * * * * * * * * *



Tray distribution system leading into control room. * * *

Construction Details for Du Pont

Control Cables and Combination Power-Control Cables
Rated at 600 Volts

CONDUCTORS - Bare, annealed copper.
Awg sizes 14 through 2, 19/w true concentric strand.

INSULATION - Black Alathon 4, BK-30 polyethylene.

Awg Size Range	Nom. Wall Thickness	Spark Test KV
14 - 10	.020"	5.0
8 - 2	.030"	5.0

Note: Minimum wall thickness is 80% of nominal specified.

JACKET OVER INSULATION - Black Zytel 37-X

Awg Size Range	Nom.Wall Thickness	A.C.Tank Test KV, 5 Minutes
14 - 10	.004"	3.0
8 - 6	.005"	4.5
4 - 2	.006"	4.5

Note: Minimum wall thickness is 60% of nominal specified.

CONDUCTOR IDENTIFICATION - Nylon Ink.
Double printing (on opposite sides). 1-1/2" maximum spacing between legends. Alternate legends inverted for universal legibility.

ASSEMBLY - Planetary method to avoid torsion in insulated conductors.
Saturated jute fillers to make round.
.001" Mylar binder tape with 20% minimum lap.

OVERALL JACKET - Black Alathon 4, BK-30.

Calculated Core O.D.	Nom. Wall Thickness
up to .450"	.030"
.451" to .750"	.040"
.751" to 1.000"	.050"

Note: Minimum wall thickness is 70% of nominal specified.

FINAL ELECTRICAL TEST - Dry Test
Each conductor to all others for 5 minutes at voltage specified for tank test of individual conductors.

ficient current-carrying capacity.

* * *

Two factors enter into the conductor diameter race. One of these factors goes back to the reliability requirements. The smaller the diameter, the higher its failure rate due to mechanical weakness. The second factor involves the physical size of the overall process plant. In a large process plant the distance from the control room to some of the process sensing elements can be, and usually is, several hundred feet. The conductor resistance therefore becomes an important factor in determining signal level. As a result of these two factors it was determined that an insulation system which could be applied relatively thin, be tough, and still stand up under chemical and atmospheric conditions was required.

* * *

Many different combinations of materials, thicknesses, and identification methods were designed and installed before arriving at the following control and signal cable specifications.

* * *

The control cable outlined is unique in several ways which I want to review:

1) It is full rated at 600 volts A.C. All IPCEA tests are given the individual conductors as well as the completed cable. We are convinced that even though the insulation thickness is below IPCEA specifications for 600 volt wire, by controlling material specifications and manufacturing techniques, insulated conductors can be manufactured with properties superior to that normally supplied on standard 600-volt conductors.

2) The insulating material is black Alathon* 4-BK-30. This material will withstand weathering, environmetal stress cracking, corrosive environments, and abrasion. A number of polyethylene control cable failures have been reported in recent years where natural polyethylene was used because the conductors were terminated in a location that exposed the natural polyethylene to ultra-violet light. Failures of this type cannot be tolerated in an automated plant.

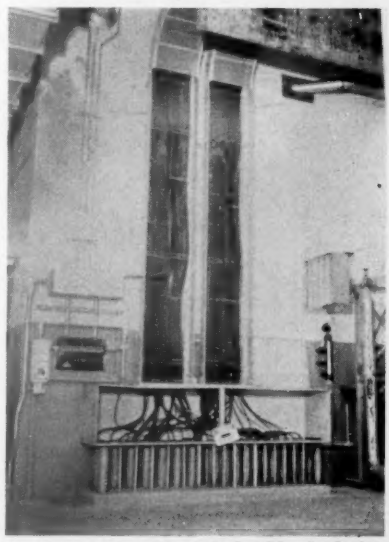
3) It is not uncommon to see Zytel* nylon resins used over the primary polyethylene insulation. The common resin has been Zytel 33, a clear tough nylon resin. This resin, however, degrades under long exposure to ultra-violet light, leading to eventual failure of the insulation system. The control cable discussed here uses Zytel 37X, a black, light-resistant nylon resin for the outer jacket of each conductor.

4) Most control cables have their individual conductors identified by color coding. This, of course, requires the use of natural polyethylene and is, therefore, subject to failure by prolonged exposure to ultra-violet light. Color coding by striping leaves much to be desired. Inks do not adhere well to polyethylene. The colors have a tendency to be difficult to distinguish. We further object to the color green being used as the National Electric Code specifies this colored wire as a "ground wire."

As a result of the foregoing objections to standard color coding, we are using a white ink on the black Zytel 37X and printing the identifications required. This ink has proven far superior to the best colored inks on polyethylene.

On cables used only for signal and control we are printing consecutive numbers on the individual conductors. We are using both the numeral and the word alternately on two sides of each conductor. The direction of printing is reversed on the opposite sides.

5) What may appear as a minor item in our control cable specifications is the use of 19 strands instead of the more common 7 strands in each conductor. This has improved the flexibility of multiple conductor cables without any measurable increase in price.



Two new power and control cable single tray networks (above) connecting with older cable in conduit system (below). * * * *

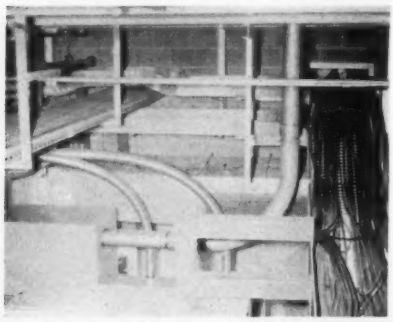
A recent semi-automated company plant used the type of control cable described in this paper installed in trays. The actual cost of this installation was compared

*Trade Mark for Du Pont polyethylene resin

with an estimate using conduit and wire. It was estimated that approximately $400,000 was saved using the cable and tray system. This saving does not include the increased cost of control room that would have been required had a conduit and wire system been used.

* * *

One of the biggest items in the saving was reduction in time required to install the wiring between the operating area and the control room after the wire-ways were installed. As a result of the lightness and toughness of the individual cables it was possible to pull as many as 26 — 19-conductor, #12 AWG cables at one time. This pull was approximately 600 feet long with six 90 degree bends. Approximately 5 million conductor feet were installed. Over one mile of tray was installed on this job. This is not the largest cable installation installed during the past couple of years nor is it the smallest. It is typical, however, and will give you some idea of what a semiautomatic plant requires in the line of signal and control cable. It is believed that if a similar plant were completely automatic the total amount of signal and control cable would be at least four times the figures previously quoted.



Large number of cables are carried in single open tray. * * * * * * * *

In another recent highly instrumental process approximately 4000 conductors were installed between the process area and the central control room. In this case we also used multiple conductor cables and trays. The cable construction was similar to that previously described. The interesting part of this installation was the cable construction between the main trays and the field instruments themselves. In the past we had used conduit and wire between the tray and the actual field device. In this installation, however, we had so many field items that a more economical and less cumbersome method was needed. After discussing this problem with several cable manufacturers, an aluminum-sheathed cable was decided upon. The individual conductor specifications were identical with those used in our normal control cable.

* * *

The aluminum sheath was covered with an extrusion of black Alathon 4 for both environmental and identification reasons. Approximately 75,000 feet of this type of cable was installed at approximately 70 per cent of the estimated cost for conduit and wire. The installation was neater and less congested. The aluminum sheath cables were terminated in pull boxes and field instruments using standard EMT fittings. We feel that this type of cable has a great future in our newer automated plants.

Building Wire

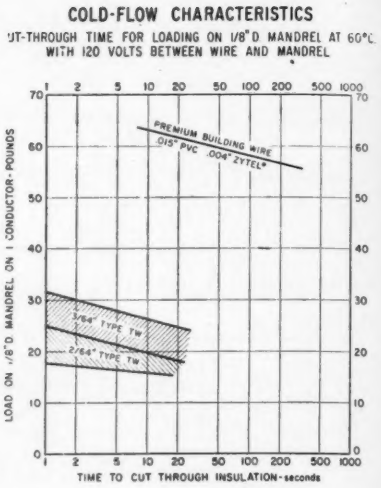
Building wire is like the weather, everyone talks about it but no one does anything about it. We decided to do something.

* * *

TW building wire has had a rather poor service record. It cut through easily, it cold-flows and is not too abrasion-resistant. For years now, we and a number of other industrial companies have insisted upon 3/64" insulation on #12 wire instead of the more standard 2/64". This has reduced outages due to failures of insulation but it has not always been easy to obtain when needed.

* * *

As a result of our test work on Alathon and Zytel, we were convinced that a high-quality building wire could be made which would have the ability to stand up under adverse industrial applications for essentially the same price as our unsatisfactory 3/64" TW. Working with our Polychemicals Department sales service personnel and one of our wire and cable suppliers, we developed an in-


COLD-FLOW CHARACTERISTICS
UT-THROUGH TIME FOR LOADING ON 1/8" D MANDREL AT 60°C
WITH 120 VOLTS BETWEEN WIRE AND MANDREL
1 2 5 10 20 50 100 200 500 1000
70 60 50 40 30 20 10 0
PREMIUM BUILDING WIRE
.015" PVC .004" ZYTEL
3/64" TYPE TW
2/64" TYPE TW
LOAD ON 1/8"D MANDREL ON 1 CONDUCTOR - POUNDS
TIME TO CUT THROUGH INSULATION - seconds

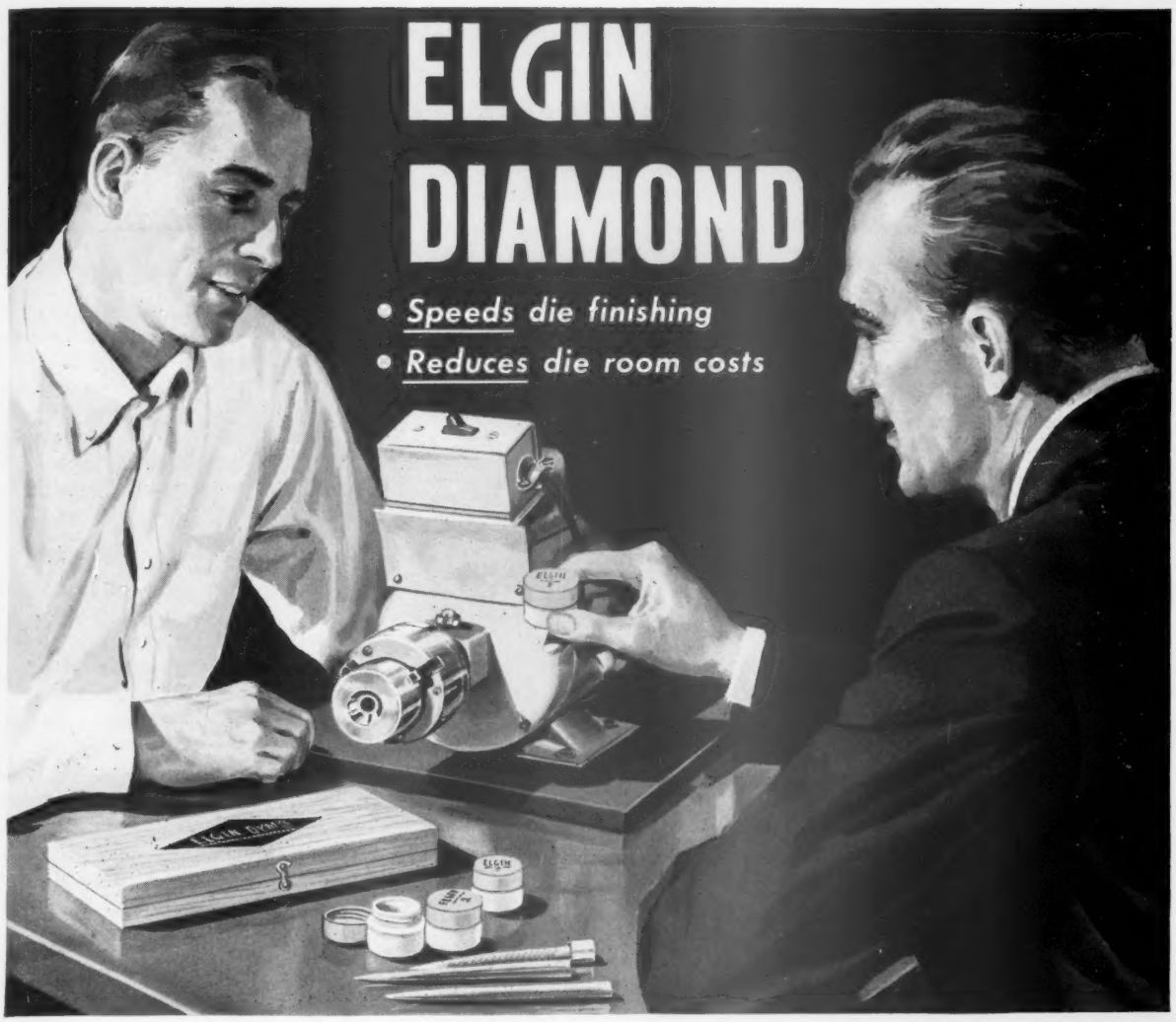
sulation system consisting of 1/64", 105°C. PVC and .004" Zytel 33 nylon resin. This construction resulted in an insulated wire with approximately 100 times better cold-flow characteristics than the best 3/64" TW. All other characteristics of the wire are superior to standard TW insulated wire. The chart on the preceding page shows the cold-flow characteristics of 2/64" TW, 3/64" TW and the new premium quality building wire.

* * *

This premium quality building wire is relatively new. We have installed approximately 500,000 feet during the past year. It has been received enthusiastically by the construction men and we believe it will go a long way towards reducing outages due to electrical insulation failures.

* * *

The use of thermoplastics as insulating materials is growing very rapidly. Materials in use today weren't even available to use 5 years ago. Who can even guess what will be available during the next 5 years. I have already been accused of "painting" the insulation on wire now. I am sure that what we are doing in a small way towards improving and reducing the insulation systems on wire and cable will be common practice in only a few years. The thermoplastic insulation field is very young. Many new and interesting plastics are on the way. Only time, ingenuity, and persistence will tell where it goes from here.



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Abrasives Division **ELGIN NATIONAL WATCH COMPANY**
ELGIN, ILLINOIS

A Few Important Facts About Lubricants

by Carl Alex Fischer
Production Manager
Fischer Company
Reinach, Switzerland

The use of the right type of lubricant in wiredrawing plays a most important part as regards die life and the surface condition of the wire in question.

* * *

We distinguish in general between:

a) Dry drawing lubricants
b) Wet drawing lubricants
c) Pastes and greases.

A. Dry Drawing Lubricants

These consist mainly of soap powders. With regard to stearates, these compounds fall into six main groups:

1.) Sodium stearate soaps (soluble in water)
2.) Potassium stearates (soluble in water)
3.) Aluminium stearates (insoluble in water) suitable for aluminium wiredrawing
4.) Calcium stearates (insoluble in water) mainly for descaled wire
5.) Manganese stearates (insoluble in water)
6.) Zinc stearates

* * *

A stearate is a salt formed by the combination of stearic acid with a base.

* * *

Stearic is obtained from stearin, a fat derived from animals and plants. It is the chief constituent of tallow and the more solid fats.

* * *

With aluminum stearates, one has to bear in mind that these types of stearate are in general not satisfactory for Chromium steels.

Aluminum and Zinc Stearates

Aluminium and zinc stearates are mostly used for special alloys, such as Chromium, Molybdenum, Iron. They also are suitable for Nickel alloys and for ordinary high carbon steel.

Calcium Stearate

In drawing high carbon steel that has been bonderised previously, calcium stearate is used quite successfully. Calcium stearate comes already mixed in the trade. It gives a very dark (almost black), but glassy and smooth finish on the wire surface.

Carl Alex Fischer

The complexity of wire drawing conditions and the bearing of proper lubricants upon speeds and finishes, makes this description of European experience worthy of comparison with American practices.

* * *

But calcium stearates are in general not to be recommended for mild steel, as mild steel is drawn at a much faster rate than high carbon steels and therefore cannot pick up the calcium quickly enough, unless it is used on descaled wire. Calcium stearate has a very high viscosity, which is required for high carbon steel.

Graphite

The use of graphite is precluded by its high cost and the difficulty of removing the dark film after drawing, although it is in fact a most effective lubricant.

* * *

Apart from these dry drawing lubricants already mentioned, there are many more lubricants on sale which have proved their worth.

B. Oil Lubricants

These are in frequent use in modern wiredrawing techniques. Soluble oils are mostly used as far as mild steel and ordinary steel wire are concerned, whereas with stainless steels, which are usually drawn at low speeds, insoluble, straight oils are used, apart from special pastes.

Typical Example for Using Oil:

This example is stated with regard to steel and mild steel. To break down a rod of ¼" in diameter, oils of a minimum viscosity of about 1000/1500 "Redwood I" at 100° F are necessary. But for very fine wire of about 0.010" and finer, a viscosity of only 50 Redwood I at 100° F is high enough.

* * *

For intermediate sizes, oils with viscosities between these limits are used.

Rape Oil

Rape oil is quite often used in wiredrawing, but generally is not to be recommended with annealing, as it quite often leaves residues on the surface. The black marks are difficult to remove.

Rape Oil and Paraffin

This mixture is mainly used for drawing tinned wire. Rape oil with a vaseline additive can also be used. In addition to this oil there are many other oils available which have withstood quite successfully many practical tests.

C. Greases and Pastes

If we use grease as a lubricant instead of oil it usually produces a much brighter finish, but as a rule we can draw the wire only one hole. It is therefore quite often used in bar drawing. As far as reduction area is concerned, there is little practical difference

(*Please turn to page* 244)

Chemically Cross-Linked Polyethylene for Wire and Cable — Progress Report

by Michael M. Suba
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and
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Michael M. Suba

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A paper presented during the Annual Convention of The Wire Association on October 13, 1959, at Cleveland, Ohio.

Introduction

Thermoplastic resins have the advantages of plasticity, easy processing, wide property range, and scrap re-use. Thermosetting resins on the other hand, have thermal dimensional stability, stress-crack resistance and toughness. Hybrid resins, combining the advantages of both, have been investigated. Such improved resins are possible by cross-linking thermoplastics. Within the past few years, techniques to cross-link polyethylene have been discovered. At present, numerous laboratories are active in making this an economic reality. Cross-linked polyethylene provides improved jacketing and insulation materials to the wire and cable industry. Filled cross-linked compounds offer an extended polyethylene with good weathering, excellent stress-crack resistance, and high tensile reinforcement depending on the filler used. However, electrical properties suffer in the presence of fillers. Hence such compounds are useful only for non-critical electrical applications, such as line wire, aerial secondary, and service-drop cable jacketing. Where the optimum electrical properties are required, unfilled cross-linked polyethylene is suitable. The unfilled cured resin, having excellent stress-crack resistance, is best used in shielded power cable applications.

* * *

Union Carbide Plastics and other companies working on cross-linked polyethylene for wire and cable applications have generally turned to peroxides to effect cross-linking. A combination of good processing and reasonable cost results. Peroxide cross-linking agents are desirable because materials can be compounded on standard plastics and rubber processing equipment. Other methods of cross-linking have been developed and are noted as follows: Cross-linking by electron radiation has been investigated by the General Electric Company and the W. R. Grace Company, among others, and gives improved thermal, mechanical and chemical resistance properties. Wire and cable manufacturers have used irradiation cross-linked polyethylene in tape and extruded wire coatings. This method suffers from the high initial investment cost of the radiation equipment. In addition, radiation of larger dimension items is not as yet industrially practical. A chlorosulfonated polyethylene which can be cross-linked has been developed by the E. I. Dupont de Nemours Company. It shows markedly improved properties, but costs involved are high.

Discussion

Mechanism Since polyethylene is essentially a saturated hydrocarbon polymer, it cannot be cross-linked by conventional agents such as sulfur which proceed through the double bonds. However, polyethylene has labile tertiary hydrogen atoms at branch points in the molecule, and these are potential cross-linking sites. Low-density polyethylene has a significant amount of branching and can be satisfactorily cross-linked with organic peroxides. The primary step is the decomposition of peroxide ROOR to form 2RO. radicals. These radicals can abstract tertiary hydrogen atoms, leaving free radical sites on the polyethylene molecule. Combination of these free radical sites on two adjacent polyethylene molecules produces cross-linking. Cross-linking can also proceed through fillers (such as carbon black) having reactive sites which chemically combine with free radicals on the polyethylene molecule.

* * *

High-density polyethylene, produced by the low-pressure process is much less branched than low-density resin. Since fewer tertiary hydrogen atoms are available, cross-linking reactions must proceed via other mechanisms, i.e. residual double bonds or secondary hydrogens. It would be expected that cross-linking would be more difficult, and indeed this is shown

by preliminary experiments.

* * *

Dicumyl peroxide[1] has a good combination of properties so that the processing of low-density polyethylene is accomplished satisfactorily with vulcanization at above 150°C. With some resins, even lower processing temperatures are possible. Several peroxides, such as dibenzoyl peroxides and t-butyl perbenzoate, are useful for more easily processible resins. Since high density resins require higher processing temperatures, the use of dicumyl peroxide as the cross-linking agent results in scorch. Recently, 2, 5-ditertiary butyl peroxy, 2, 5-dimethyl hexane,* a peroxide having a higher decomposition temperature, may satisfy the higher temperature requirements of high-density resins.

* * *

Our investigations have covered both resin and filler variables. As indicated in the following sections, the type and loading of filler affect properties. Likewise, the type of polyethylene influences peroxide cross-linking. Lower melt index resins require less cross-linking agent to achieve optimum properties. However, processing considerations suggest the use of medium melt index resins such DYNH when using dicumyl peroxide.

* * *

Physical Properties Both filled and unfilled polyethylenes were tested for physical properties. In these tests 0-8 parts dicumyl peroxide per 100 parts resin were compounded** and then press-cured. The filled systems contained 100 phr MT carbon black.*** Yield strength is an important property for wire and cable manufacturers, and is illustrated in Figure 1. Marked improvement is noted in the filled system up to about 6 phr dicumyl peroxide, but there is practically no effect on the unfilled specimens. Above 6 phr peroxide, there is a drop-off in yield strength in the filled systems particularly at 100°C. Tensile impact strength is markedly improved by cross-linking in both filled and unfilled materials, as shown in Figure 2. Here again there is a drop-off, after 2 phr in the unfilled and 4 phr peroxide in the filled. Figure 3 shows that dicumyl peroxide addition lowers the ultimate elongation.

FIGURE 1
YIELD STRENGTH
VS.
DICUMYL PEROXIDE CONCENTRATION

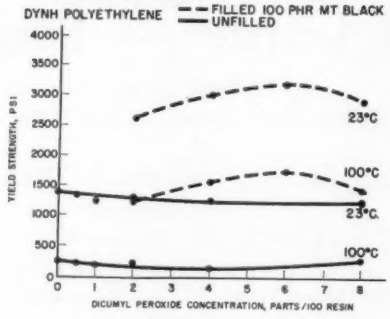


FIGURE 2
TENSILE IMPACT STRENGTH
VS.
DICUMYL PEROXIDE CONCENTRATION

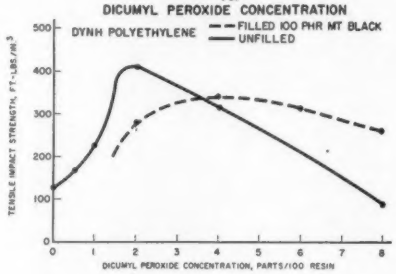


FIGURE 3
ULTIMATE ELONGATION
VS.
DICUMYL PEROXIDE CONCENTRATION

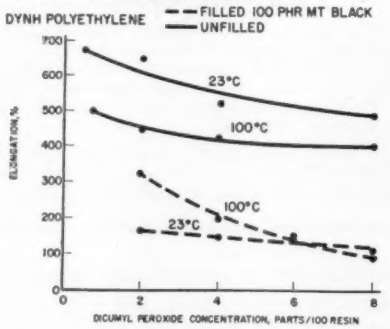
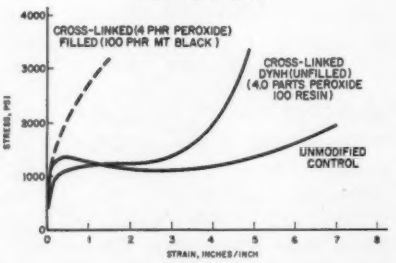


FIGURE 4
STRESS-STRAIN CURVES
DYNH POLYETHYLENE



Stress-strain curves are shown in Figure 4. The unmodified polyethylene curve is typical showing a rise in stress to the yield point, then a decrease and leveling off in stress as elongation occurs. Stress then rises before the specimen breaks. The dicumyl peroxide curves show the effect of cross-linking. Up to the yield point, the unfilled curve is the same, but the stress remains fairly constant as the specimen elongates up to about 300% elongation (3 inches/inch). Then stress increases rapidly as ultimate tensile strength is approached. In filled systems cured with dicumyl peroxide, the specimen usually breaks at the yield point, and this is shown in the third curve. Of major interest is the increased resistance to elongation of the dicumyl peroxide specimens. In Figure 5, crystalline freezing point decreases as peroxide concentration is increased — i.e., crystallinity goes down with cross-linking. As a result specific gravity and stiffness (secant modulus) also decrease as shown in Figures 6 and 7. Figure 8 shows a decrease in brittle temperature caused by dicumyl peroxide addition. Greatest improvement in the filled system is noted at 2 phr peroxide.

* * *

Another major advantage obtained is elimination of stress-cracking. Unmodified polyethylene normally stress-cracks. Dicumyl peroxide modification has a marked effect. The Bell Labs stress-cracking test was used with concentrated "Igepal"* at 50°C. All unmodified specimens failed within 20 minutes of exposure. But filled and unfilled materials, cross-linked with 1.0 phr dicumyl peroxide, did not fail at all for the 21-day duration of the tests. Stress-cracking resistance is enhanced by removal of the low-molecular-weight fractions of polyethylene; cross-linking eliminates these fractions by forming high-molecular-weight 3-dimensional networks. Materials

(1) Such as "Di-Cup," product of Hercules Powder Company.

*Such as "Varox," product of R. T. Vanderbilt Co.

**Filled - Banbury at <120°C, plus 5 passes on 2-roll mill.

Unfilled - 2-roll milled for 5 minutes at 95-98° after dicumyl peroxide added.

***Such as "Sterling" MT, product of Godfrey L. Cabot, Inc., or "Thermax" MT product of R. T. Vanderbilt Co.

*Product of Antara Chemicals, Division of General Aniline & Film Corporation.

FIGURE 5
CRYSTALLINE FREEZING POINT
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE-UNFILLED

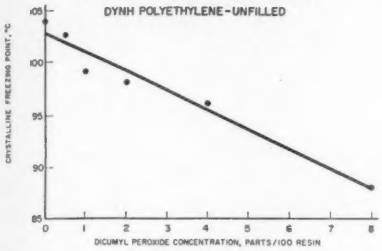


FIGURE 6
SPECIFIC GRAVITY
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE-UNFILLED

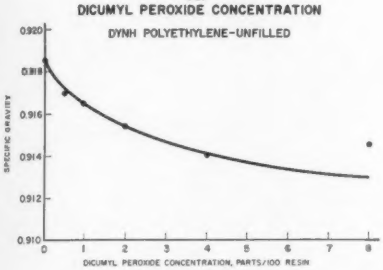


FIGURE 7
SECANT MODULUS AT 1% ELONGATION AT 23°C
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE — — FILLED 100 PHR MT BLACK
—— UNFILLED

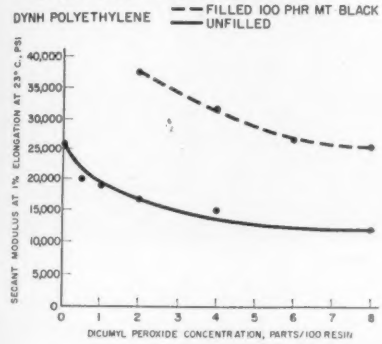
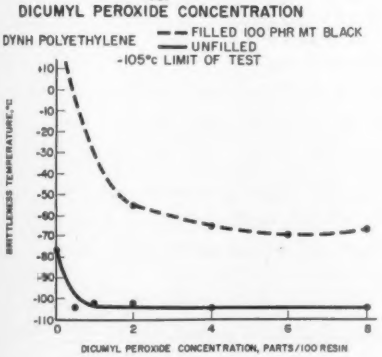


FIGURE 8
BRITTLENESS TEMPERATURE
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE — — FILLED 100 PHR MT BLACK
—— UNFILLED
-105°C LIMIT OF TEST



were also tested for abrasion resistance. This property declines slightly as peroxide content increases. For the intended applications, though, both filled and unfilled systems have acceptable abrasion resistance.

FIGURE 9
% SOLUBILITY
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE-UNFILLED
IN
90°C TOLUENE FOR 1 HR.

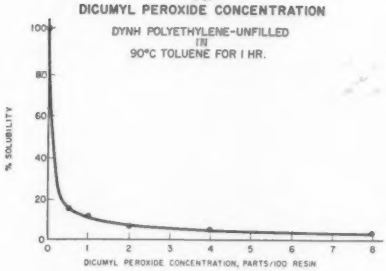
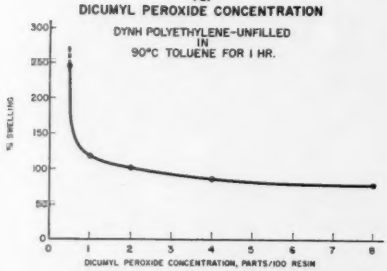


FIGURE 10
% SWELLING
VS.
DICUMYL PEROXIDE CONCENTRATION
DYNH POLYETHYLENE-UNFILLED
IN
90°C TOLUENE FOR 1 HR.



Improved solvent resistance is a big advantage afforded by dicumyl peroxide. Figure 9 shows the effect of 90°C toluene on unfilled polyethylene sample squares for one hour. Only a small amount of dicumyl peroxide decreases solubility greatly. Filled polyethylene, although not shown, acts the same. A filled sample with 4 phr peroxide withstood 16 hours in 120°C xylene, with only 3 per cent extracted. The cross-linked polyethylene system consists of two components; cross-linked three-dimensional networks which do not dissolve, and non-cross-linked polymer which normally dissolves in a good solvent. Solvent enters the system and attacks the polymer units which are not cross-linked. This creates internal forces between polymer units tending to dissolve and those which will not dissolve. The net result is a swollen material with swelling tending to decrease as the dissolving tendency is reduced, i.e. as cross-linking increases. Figure 10 shows that swelling decreases with increasing peroxide content. It also shows that not much additional cross-linking is caused by using over 2 phr peroxide in unfilled systems. Filled systems require somewhat more peroxide to cross-link.

* * *

Electrical Properties Carbon black, as a reactive filler, improves the weatherability and tensile properties of polyethylene, and as an extender provides certain economies. For these reasons, carbon black filled systems are of greatest interest to wire and cable manufacturers. In studies of carbon black variables, both the amount and type of black influence the electrical and physical properties. Excellent tensile reinforcement in cross-linked low-density polyethylene is obtained with very fine basic blacks (such as ISAF or HAF blacks). However, such compounds have low electrical resistivity, and poor impact and brittleness properties. Best electrical properties for insulation are attained with the coarse thermal blacks. Electrical properties are also improved by good dispersion of the carbon black.

* * *

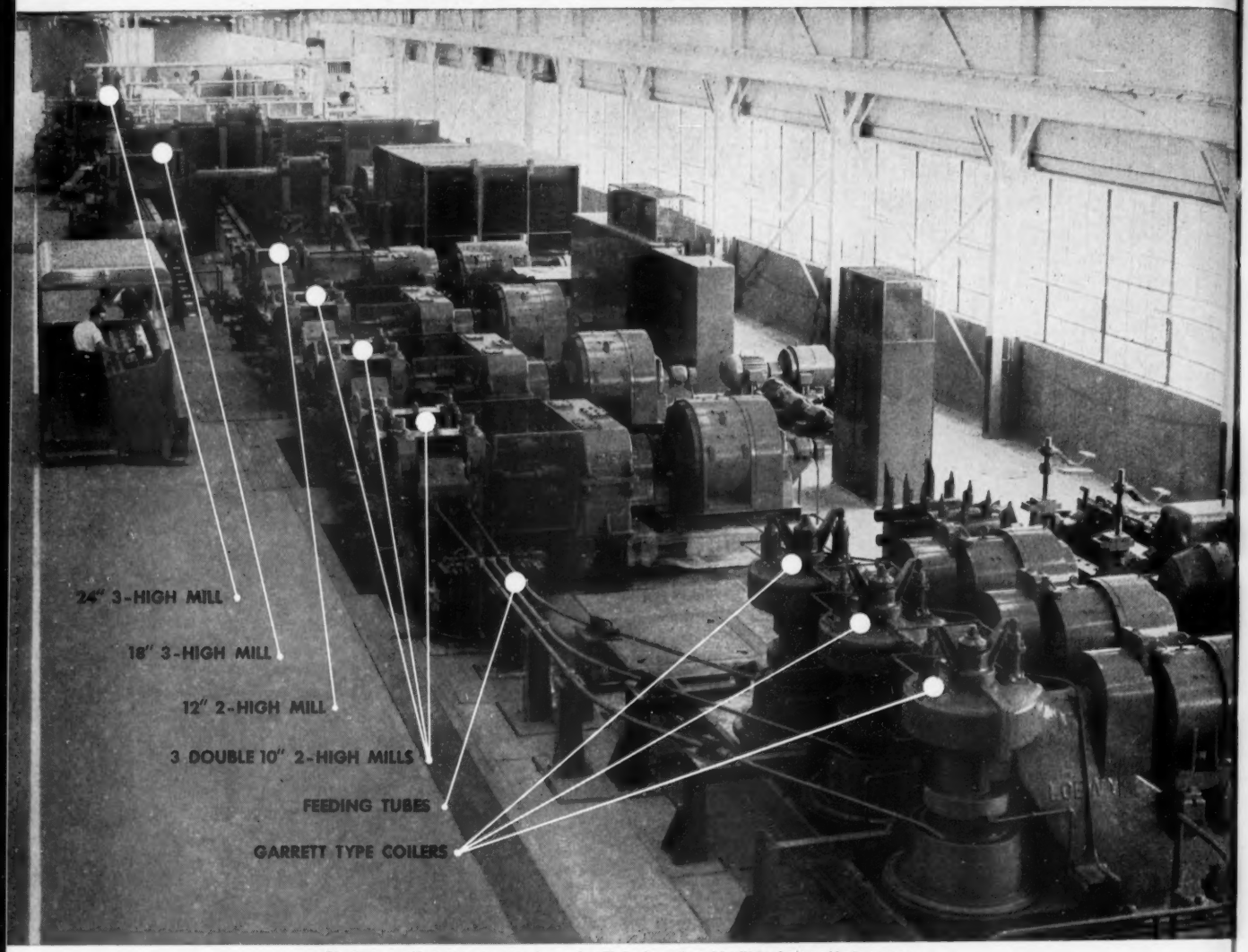
The table below shows some electrical properties of cross-linked and non-cross-linked, and

(*Please turn to page* 246)

ELECTRICAL PROPERTIES OF POLYETHYLENES

	Volume Resistivity ohm/cm	Dielectric Const. @ 23°C	Power Factor 23°C @ 10^6 Cycles	Breakdown Voltage ST	
				Orig.	14 days @ 120°C
Unfilled DYNH	$>1 \times 10^{16}$	2.3	0.00025	>500	>500
Cross-linked unfilled DYNH	$>1 \times 10^{16}$	2.3	0.00035	>500	>500
Filled DYNH*	—	—	—	—	—
Cross-linked filled DYNH	4×10^{9}	9.7	0.020	150	300

*Material brittle when extruded onto wire — No values possible.
Cross-linked unfilled DYNH - 2.0 phr dicumyl peroxide
Cross-linked carbon black-filled DYNH
—100 phr MT carbon black
—3.0 phr dicumyl peroxide



Modern continuous copper wire rod mill designed and built by Loewy-Hydropress.

LOEWY wire rod mills reduce wire bars to 5/16 in. wire rod automatically

This Loewy copper wire rod mill, which has been in successful operation for 2 years, rolls 5/16 in. wire rod from standard wire bars in a continuous operation. It is fully automated and all phases are controlled from one pulpit.

In addition to excellence of product, the owner is extremely pleased over the fact that, due to automatic operation, this installation permitted him to start operations with an inexperienced crew.

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The Drawing of High Carbon Steel Wire at High Speed

by W. Holloway, Jr., Director
Martin Black & Co. (Wire Ropes) Ltd. and Speedwell Wire Co. Ltd.
Coatbridge, Scotland

In common with most other processes, the drawing of high carbon steel wire has moved with the times and drawing speeds have increased gradually over the past 30 years. In addition to increases of speed, the tendency has been to increase productivity and machine efficiency by providing an increasing amount of automation in the process.

* * *

Last, but most important, has been maintaining and in fact the improving of quality and finish of the wire at the higher speeds. Almost every time an increase in the speed of drawing high carbon steel wires has been contemplated, voices have been raised in protest, maintaining that the quality and finish of the wire would suffer.

* * *

Tables 1, 2 and 3 below show test results on normal production runs.

In order to achieve drawing speeds of 3000/3500 f.p.m. on carbon steel wires, it is essential that the technique of wire drawing and the design of the machines should be of the highest standard.

* * *

In particular, the control to be exercised on the patenting, cleaning and coating of the wire must be very tight to ensure consistently well prepared wire. Batch treatment proves fairly satisfactory for drawing speeds up to 2000 f.p.m. but "in line" process of patenting and cleaning under close control is essential for higher speeds.

* * *

The patenting furnaces are purged with atmosphere reducing gas which gives the effect of considerably reducing scale from the surface of the patented wire. Hydrochloric acid is used to clean the wire finally; the acid is regularly checked for strength to ensure consistent pickling throughout the run. It is recommended that a high pressure water swill be used to force off the carbon smut left on the wire after pickling. The wire is then passed through a 10% borax solution at a temperature of 80/90°C. The bath need only be long enough to allow the wire to be raised to the temperature of the solution, to give a rapid drying off of the Borax coating.

W. Holloway, Jr., Esq.

* * *

Out of the innumerable soaps available on the market, Wyrax compound has been found to be the most satisfactory. Agitation of

TABLE 1.

345 Coils weighing 735 cwt.
.039 bright improved plough 120/130 tons per sq. in.
Made from steel with the following analysis:

C	Si	P	S	Mn
.73	.10	.033	.043	.70

Drawn on an 18-in. Barcro BB machine at 3,000 ft. per min.

	MIN.	AVERAGE.	MAX.
Dia. of wire	.0388″	.039″	.0393″
Tensile in tons per sq. in.	123	126	129
Torsions in 100 dia.	43	47	50

TABLE 2.

210 coils weighing 214 cwt.
.031 bright improved plough 120/130 tons per sq. in.
Made from steel with the following analysis:

C	Si	P	S	Mn
.70	.16	.039	.30	.70

Drawn on a 12-in. Barcro BB machine at 3,500 ft. per min.

	MIN.	AVERAGE.	MAX.
Dia. of wire	.0298″	.031″	.0313″
Tensile in tons per sq. in.	122	125	128
Torsions in 100 dia.	46	49	51

TABLE 3.

1442 spools (6½ in.) weighing 206 cwt.
.018 galvanised improved plough 116/125 tons per sq. in.
Made from steel with the following analysis:

C	Si	P	S	Mn
.74	.131	.030	.036	.66

Galvanised to BSS 443 drawn on a Barcro BB 8 in. machine at 3,500 ft. per min.

	MIN.	AVERAGE.	MAX.
Dia. of wire	.018″	.018″	.0182″
Tensile in tons per sq. in.	120	123	125
Torsions in 100 dia.	38	40	43
Wt. of zinc in oz. per sq. ft.	.42	.46	.47

the lubricant in all soap boxes is advantageous, but other than this, no special design of soap box is required.

* * *

The feeding of the machines at speeds as high as 600 f.p.m. for 6 B & S to 11 B & S gauge from coils on rotating swifts is quite satisfactory with little or no down time for broken wires; in the smaller size range between 12 and 19 B & S gauge, it is necessary to feed in from spooled wire to give a smooth trouble-free pay-in. The spooling of the "in line" prepared stock need not add to the labour costs, this can be done by substituting spools for blocks on the winding frames.

* * *

The Speedwell Wire Co. Ltd. had been operating for several years at 2000 f.p.m. with **Barron & Crowther** machines of the overhead take off type, but for higher speeds the double tiered block design is more suitable because of its good cooling system, its automatic control of accumulation and its potential 100% efficiency.

* * *

Machines have been installed to the following specifications:

TABLE 4.

Block dia. ins.	18"	12"	8"
Max. inlet size ins.	.160	.116	.072
Finished wire range ins.	.054/.037	.036/.021	.020/.010
Finished tensile tons p. s. i.	up to 120/130	up to 120/130	up to 130/140
Finished speed f. p. m.	3000	3500	3500
Number of dies	9	9	12

Machine Design

In general, increases of speed in machinery require the limits to which the moving parts are manufactured to be closer than previously. Balancing of the rotating parts becomes necessary above certain speeds and again the effects of the inertia of the rotating parts introduces problems that require careful study. From the operational point of view, increases in speed represent greater weight per hour throughout and unless special steps are taken, the operator may become overloaded and the efficiency of the machine may drop. The Barron and Crowther machines are of the cumulative type but twist free. The accumulation helps considerably in cooling the wire between drafts and the absence of twist, apart from producing a more consistent wire, enables any one block in the machine to be stopped while all other parts can continue to run. This fact is important in two ways in that

1. It provides a potential 100% efficiency of the machine by eliminating stops for removal of drawn wire, and
2. It allows intermediate blocks to be started and stopped very simply by automatic control.

* * *

In addition to the usual water cooling of dies and block interior surfaces, a special air cooling system blowing air on to the wire on the blocks is fitted which combined with the accumulation principle of the machine ensures a very good cooling of the wire. The drawn wire leaving the machines is barely above ambient temperature. The drive is through squirrel cage motors started direct-on-line and therefore the capital cost of electrical equipment is the lowest possible.

Machine Efficiency

If the finishing block is made to run at maximum speed at which it is considered possible to draw a particular range of wire and is made of the accumulation type then further units are added to collect wire either on spool or coils, or if necessary, both. These units are designed to run a little faster than the final drawing block which accumulates a store of wire sufficient to allow the operator to take off a coil or spool of wire without stopping production.

* * *

With an A.C. cumulative type machine the speeds of the blocks are so arranged as to cause the blocks when running, to draw on to themselves a little more wire than the block following draws off. Thus after a time each intermediate block has to be stopped manually and allowed to reduce its excess reservoir before it can be re-started again. These operations can occur at a time when the operator is either occupied welding the inlet wire or removing a drawn coil or spool. This tends to overload the operator, with a resultant lowering of spindle efficiency and loss of production. The automatic control fitted, relieves the operator of this anxiety and enables him to concentrate on feeding the machine at the inlet end and disposing of the drawn wire, with only an infrequent check of the wire in the machine.

* * *

One man handles one such machine with his time usefully taken up without being overloaded and Table 5 below shows the quantities

(*Please turn to page* 242)

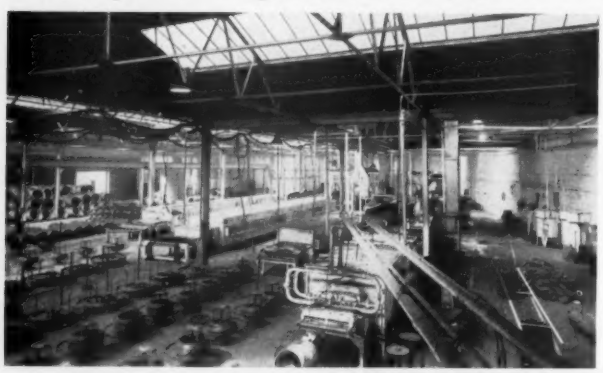

Fig. 1—Furnaces, showing the continuous in-line process of patenting, pickling, water swilling and boraxing, or alternately fluxing and galvanizing. * * * * * * * * * * * * * * * *

Fig. 2—Barcro BB high-speed wire-drawing machines, showing the 12 in. machine with its direct spooling on to a bobbin on the right, the 8 in. machine on the left, and the 18 in. machine in the background. * * * * * * * * * * * * * * * *

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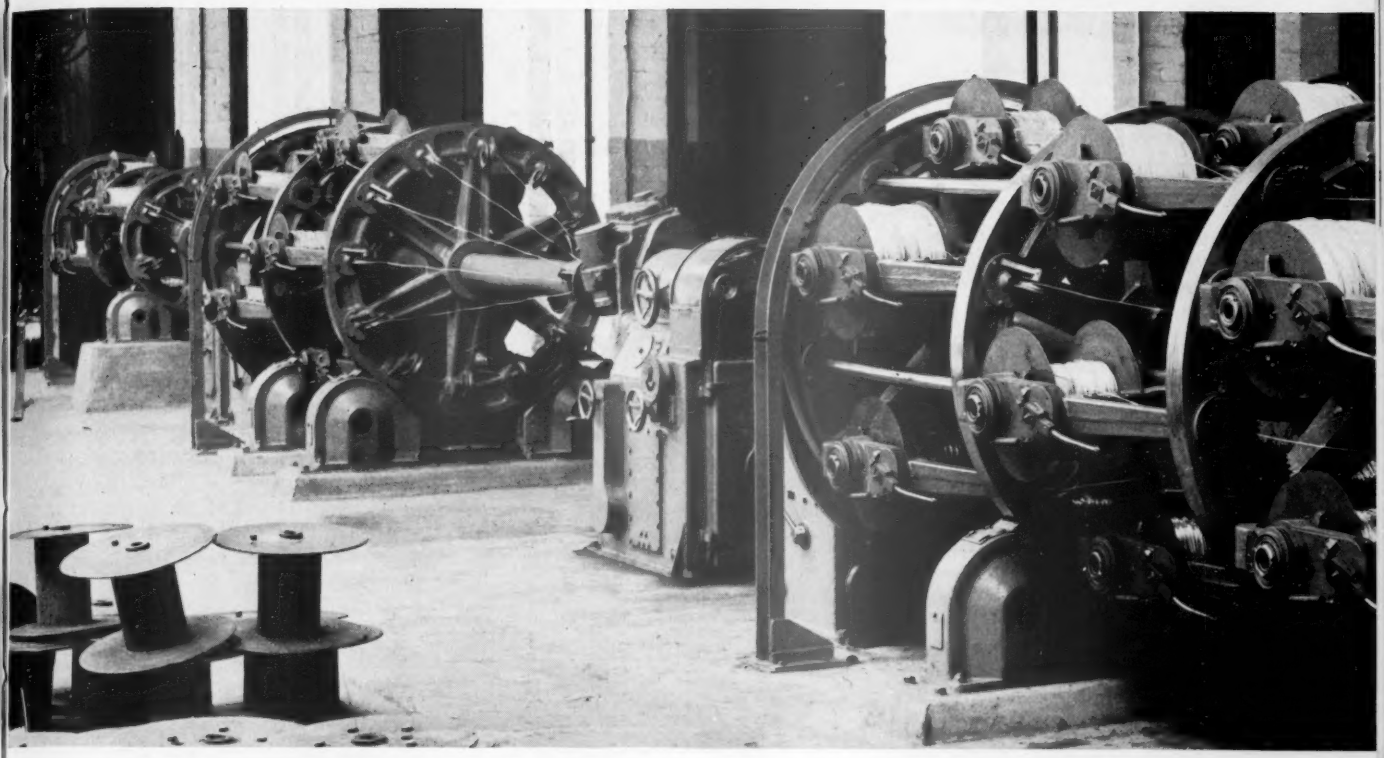

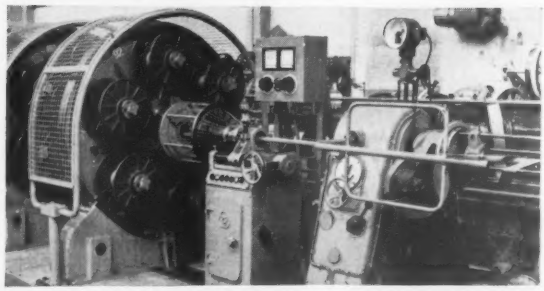

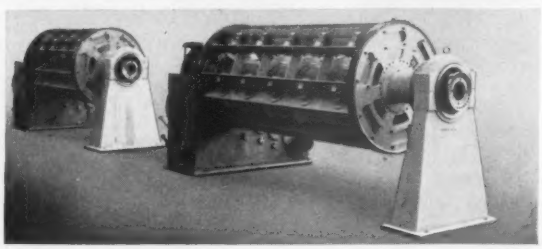

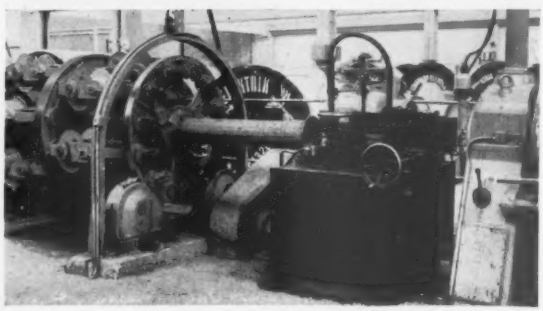

Cage Stranding Machines for Power Cables

Top:
Cage with bobbins arranged for back twisting

Left, top:
Cage with concentric bobbin arrangement

Left, center:
Cage with tangential in-line bobbin arrangement

Left, bottom:
Wire armoring cage with bobbins arranged for back twisting

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For information, please contact Krupp International Inc., 375 Park Avenue, New York 22 N. Y.

Observations in European Wire Mills

by Clarence S. Arms
Consulting Wire Mill Engineer
Worcester, Massachusetts

It is always interesting to know what our fellow industry members are doing in other parts of the world and in this article Mr. Arms sets forth some of the things he saw and his conclusions. He was for many years manager of the Thomson Wire Company's Worcester plant.

It may be of interest to some readers of **Wire and Wire Products** to know of some of the observations I made while acting as a wire mill consultant in various wire mills in Europe.

* * *

During the past few years I have had clients in England, Sweden, Belgium, France and Italy. My remarks refer only to those mills in which I worked.

* * *

As expected, I found some of these mills very old, operating obsolete equipment, but slowly being improved by the addition of more modern equipment, some of which was of American make.

* * *

The English mill, or mills, (there were five separate mills in this group) was the most modern of any of the mills I visited. It was equipped with Vaughn high speed continuous wire drawing machines and Trauwood electric furnaces. There was a most efficient fine wire drawing department, several trauwood type fine wire tempering furnaces, and also a separate department drawing pinion and other shaped wires.

* * *

In this English mill I was impressed with the large variety and numerous types of both high and low carbon wires being produced, a large percentage for export. This mill compares favorably with the best American wire mills.

Sambre-Escaut Wire Mill at Antwerp, Belgium

This mill, located on The Scheldt river, which has 31 miles of quays and wharves in Antwerp, is ideally situated, near the North Sea, for export transportation by water. It is one of the oldest wire mills in Belgium, having a monthly capacity of 8000 tons, mostly low carbon wire. Rods are received by barge from Cockerill-Ougree, a large integrated steel mill near Liege, Belgium.

* * *

During the period from 1926 to 1950 Sambre-Escaut was a member of The European Wire Cartel. Due to its location it was allocated the export market. Consequently, when this Cartel was abolished in 1951, Sambre-Escaut found itself with very few customers in its home market and also keen competition for the export trade.

* * *

Its principal products are nails, market wire, barbed wire and poultry netting. Equipment is old, wire drawing speeds slow, transportation expensive and the upkeep of the equipment costly. I found 93 employees in the office, 80 in the mechanical department with 610 production workers. Rods were costing $103.17 per 1000 kg. delivered in 1956, with an average earning 53c per hour for wire drawers.

* * *

It is not hard to understand why Sambre-Escaut found itself in financial difficulties. Recently Sambre Escaut was absorbed by Cockerill-Ougree, new management employed, and a program of improvement started.

* * *

It was a surprise to me to note that in the mills I visited, both in Belgium and France, their principal products were the same as made by their grandfathers 75 years ago; nails, barbed wire, poultry netting and coiled market wire. The farmer and builder absorb 80% of their output. Manufacturers did not appear among their customers.

Wire Mills in France

I visited eight wire mills in France, five operated by Trefileries et Laminoirs du Havre (main office in Paris) and three owned by Lefort & Co. of Mohon; also the rod mill and integrated steel plant of Hauts Fourneaux de la Chiers at Languay. This rod mill supplies all the rods used by the abovenamed wire mills. It is a modern three-strand continuous mill, finishing 550 lb. coils of rods, with a monthly capactiy of about 19,000 tons. Rods are loaded into open cars directly from the conveyor. For some mills, a wire rope sling is threaded through six coils of rods before they are loaded and left in place during transportation. This makes a most convenient way to unload at the wire mill.

* * *

With the excepton of the mill at Le Havre, which is a high carbon plant, drawing wire for its own wire rope production, the principal products of the above mills are nails, barbed wire, poultry netting and coiled market wire in 5 kg. coils. The Le Harve mill, in addition to making wire rope, also rolls copper rods from 4" x 4" billets. They have a most modern high speed continuous mill rolling aluminium rods and a very fine plant drawing copper and aluminium wire which is fabricated into power cables. I found the plant at Le Havre modern in every respect and very efficient.

* * *

Refer to the photograph, Figure 1, which shows the coarse wire mill at Le Havre. Note the tall stems loaded with wire, the bases on wheels. These stems were rolled to the galvanizing department, the wire threaded off the top, and through the galvanizing unit.

* * *

The photograph, Figure 2, shows a part of the fine wire finishing machines. This type of wet wire

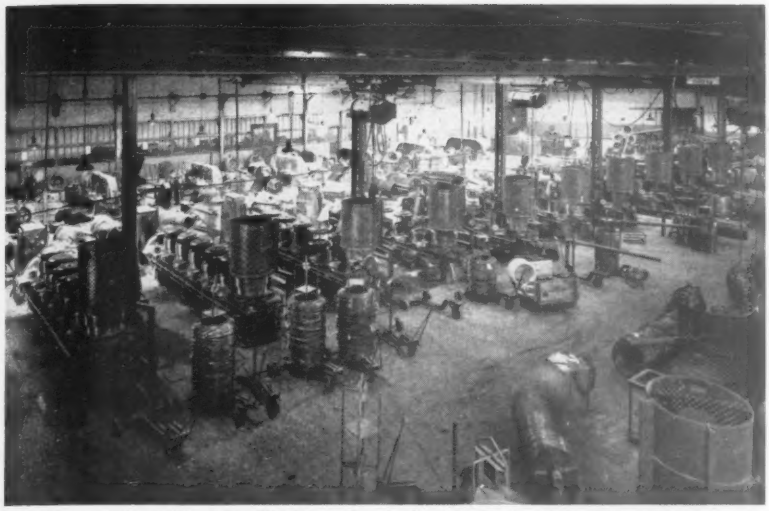


Fig. 1—Coarse Wire Mill of Trefilleries et Laminoires du Havre at Le Havre, France. * *

drawing machine is common in Europe.

* * *

The wire mill at St. Dents, just out of Paris, is one of the older wire mills in France. It produces about 2500 tons of low carbon wire, largely for nails, barbed wire, netting and coiled market wire. The mill formerly had its own Open Hearth and Rolling Mills. They are now dismantled, all their rods coming from Languay.

* * *

Of particular interest in this mill was the fact that they have **no** cleaning house. During the recent wars acid could not be secured, consequently it was necessary to develop the art of descaling the rods by mechanical means. In this they have been very successful, drawing 5mm rods at 900 ft. per minute to .080 and then to .036 at 1000 ft. The same method of descaling existed in all mills visited in France, with the exception of the high carbon mill at Le Havre. The "Line-Gorcy" descaler is used in several mills. In addition to this descaler one mill had an ingenious method of removing any fine particles of scale adhering to the rod. A distance of about six feet was allowed between the descaler and the first wire-drawing die. A rapidly moving bar, activated by a cam driven from the shaft of the wire drawing machine, was striking repeated blows on the rod, thus causing a rapid vibration of the rod, similar to a piano string. One could see a halo of fine scales surrounding this vibrating rod.

In spite of the rather light weight and low power available on French rod drawing machines, they have been able to increase the finishing speed by adding a separate finishing block, driven through a variable speed drive and its own motor. This allows the first four blocks to run continuously, the wire building up on these blocks and being removed from their tops. The finishing block is speeded up to reduce this accumulation, then shut down to strip. A rather ingenious method of overcoming a mechanical deficiency!

Fig. 2—Fine Wet Wire Mill of Trefilleres et Laminoires du Havre at Le Havre, France. * *

Other things of interest include fine wire frames, on which each block could be speeded up and the wire from the finishing blocks "metered." The operator's production was not weighed, but the feet of wire finished was recorded and then converted into pounds. The meters were so arranged that they would record only when the blocks were drawing wire.

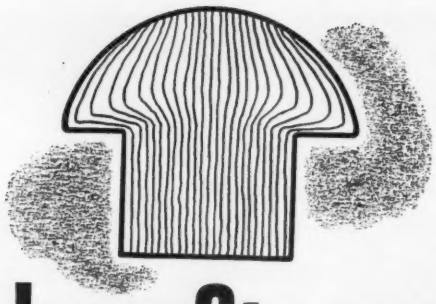
* * *

I saw galvanizing frames on which the wire was drawn through the unit by one block, going to a second block. Thus the second block could be shut down to strip while the first block remained in operation.

* * *

Among other unusual processes was a method of patenting high carbon wire and delivering a product free from scale, one which could be drawn to fine sizes without cleaning. This unit consisted of a 30 ft. electrically heated furnace, with three zones of heat control. The furnace contained ten 1″ diameter stainless steel pipes. The wire being pàtented entered the pipes through stuffing boxes, to exclude the entrance of any air. On the outgoing end ½″ stainless steel pipes 20′ long were joined to the 1″ pipes. These ½″ pipes were inside larger pipes, through which water was running. The wires were thus cooled down to a temperature at which no scale was formed. Because of the gases formed in the pipes from the coating on the wires there was a flow of gas out of the ½″ pipes which prevented the entrance of any air. I was

(*Please turn to page* 246)



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Modern Methods of Annealing Wire

by F. Frodsham, Esq.
Rylands Brothers Ltd.
Warrington, England

This paper was presented by the author before the Staff School of the Caledonia Works of Frederick Smith & Co. Wire Manufacturers Ltd., by whom it was copyrighted and through whose kind permission it is published here.

The importance of the Annealing Department in a modern wire industry is becoming more and more paramount and during the past 25 years there has been a remarkable transformation in ideas and their applications. Primarily the object of annealing is to remove the effects of cold working previously carried out in reducing a wire from a hot rolled rod, thus enabling further drawing to be applied and making possible the production of wires of a very wide range of sizes; and also to supply wires in the dead soft condition or to any particular range of physical properties specified by a customer. Elaborating on this, as wire is drawn it becomes harder —less ductile—and more difficult to work until a point is reached when no further drawing can be safely applied. If the wire is then annealed the effects of drawing are removed and the wire is put into such a condition that further reduction is possible. It can again be drawn almost to the point of nil ductility at which it would begin to break up. Further annealing is then required and this treatment of drawing and annealing can be repeated several times to produce wires of one or two thousandths of an inch in diameter.

* * *

Annealing becomes of great importance when producing to customers' specifications which cannot be met by drawing wire hard from the rod. In these cases wire is drawn to an appropriate base size for annealing, from which a known reduction of area can be applied to yield the required change in physical properties; e.g. wire required with a final tensile of 28 tons/sq. in. only requires a reduction of area of 10 or 12% but wire required with a tensile of 35/40 tons/sq. in. needs a reduction of approximately 35%. These examples only refer to wire with a low carbon content.

Before enlarging on the reason for the drop in tensile during annealing it would be advisable to make a brief study of the mechanical properties of plain carbon steels. The most important constituent of steel is the element carbon which chemically combines with iron to form the compound iron carbide. An intimate mixture of 13.5% iron carbide (cementite) and 86.5% of iron (ferrite) forms the constituent pearlite. In steels of less than .85% carbon, (i.e. hypo-eutectoid steels) there exists the constituent pearlite, the other constituent being free ferrite. In hyper-eutectoid steels(over .85% carbon) there is again the constituent pearlite but the other constituent is free cementite. There is a wide difference in the properties of ferrite and cementite, the former having a Brinell hardness of about 67 whereas that of cementite is about 600. Ferrite is soft and tough; cementite is hard and brittle. An intimate mixture of the two must therefore possess properties intermediate between these two extremes.

* * *

As previously stated the object of annealing is to remove all the effects of cold working. As soon as heat is applied in any noticeable degree to a piece of steel, certain structural changes in the metal take place. These changes which are regarded as being beneficial for the purpose in mind are rendered permanent by heat treatment. This permanency is made possible by certain phenomena. As already shown steel is composed of soft iron (ferrite) and iron-carbide (cementite). At a certain temperature the iron-carbide begins to dissolve in the iron and forms a constituent known as austenite. If after this transformation has taken place the steel is allowed to cool normally, the ferrite or cementite according to the composition of the steel, is precipitated or thrown out of solution. When the remaining solution reaches its eutectoid point, particles of ferrite and pearlite or cementite and pearlite are deposited side by side. Examination of micro-structures of material at varying stages of heat treatment reveal the occurrence of three types of distinguishable processes, viz. (a) Recovery (b) Recrystallisation (c) Grain Growth. (See Fig. 1).

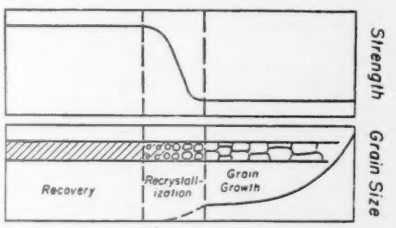


Fig. 1 - Schematic representation of recovery, recrystallization and grain growth

Recovery is a change in the properties of the material at low annealing temperatures but there is no detectable change in the micro-structure of the material. It can be likened to a gradual relieving of the stresses set up by the original cold working.

* * *

Recrystallisation occurring at higher temperatures is a process of the formation and growth of new grains supplanting the cold worked structure.

* * *

Grain growth, occurring in completely recrystallised material is a continued growth of recrystallised grains. It will be observed from the illustration that there is no fall in tensile strength until recrystallisation is fairly well advanced. If the material has not had sufficient reduction in drawing the points from which recrystal-

lisation commences are set so far apart that the grain grows to an abnormally large size, which imparts to the material brittle characteristics. This is known as "Steads Brittleness".

* * *

Having briefly studied the object and mechanism of annealing a review can be made of the plant required for the operation. The older type of annealing plant consisted of a series of coal-fired furnaces each having a furnace chamber into which could be lowered one or more mild steel pots containing the wire. The pots used for annealing 22″ and 18″ diameter coils were cylindrical in shape, whereas 12″ diameter coil was loaded into pots of clover leaf design. A lid was placed on each loaded pot and then sealed with mortar. The weight of charge varied from 30 cwts. of 22″ coil to 50 cwts. of 12″ coil. Consequently there was a varying furnacing time, from 7 hours for the former to 10 hours for the latter. After removal from the furnace chamber the pots were placed in a cooling pit for approximately three hours before they were emptied and recharged. One of the faults with this type of annealing was too much dependence on the human element to see that a satisfactory product was turned out. In bringing the charges up to temperature, dependence was placed in the skill of the firemen to visually assess the temperature of the wire. His job was synonymous with hard physical effort in uncongenial surroundings and failure to do his job efficiently resulted in indifferent annealing, with hard and soft patches throughout the coils. However, with modern methods of annealing equipped with pyrometric control all the guess work has been taken out of the job and working conditions have improved tremendously.

* * *

Modern types of annealing furnaces can be split into three groups. Viz:

(a) Salt Baths.
(b) Muffle types heated by town's gas.
(c) Electrically heated types for batch annealing.

* * *

Salt baths are not very much in favour, but where they are in operation they can be allied to a cleaning range to give an annealed cleaned and limed product ready for further drawing in a very short space of time. The metal baths are filled to an adequate depth with salts consisting of 60% sodium carbonate and 40% potassium chloride which have a melting point of approx. 580°C. Six large electrodes are suspended vertically over one side of the bath, most of the electrodes being immersed in the molten salt. The heads of the electrodes are connected to a transformer by means of buss bars and so that heat will not pass along the buss bars the electrodes are fitted with a hollow head through which cooling water is passed. Temperature control is effected by a pyrometer which is coupled to a recording chart. A power operated sliding lid is fitted over each bath so that it is completely enclosed except during a charging or discharging period.

* * *

The wire is loaded on to heat-resisting metal yokes which have a cross-bar for lifting and four slotted plates at right angles which act as separators between the coils. Heat-resisting bars are then pushed through the slotted plates so that when the yoke is lifted the coils are suspended on these bars. The loaded yoke is then lowered into the molten salt until the cross-bar is resting on two ledges at the ends of the bath. The lid is then put in the closed position and the furnace power switched on. The charge is brought up to temperature and soaked for an adequate period.

* * *

At the end of the soaking period the yoke is lifted out and placed on two horizontal arms, where it is left to cool slowly. After approximately 20 minutes it is lowered into a quenching tank which removes most of the salts which have adhered to the wire. It is subsequently removed from the quenching tank, cleaned in hydrochloric acid, swilled in clean water, limed and ovened ready for further drawing. It is obvious that quite a lot of salt will be removed from the furnace and deposited in the quenching tank. This can be reclaimed by periodically pumping water from the quenching tank into a separate bath which can be heated, usually by a series of gas burners. The water is boiled off and leaves behind the residual salt, which can be used again in the furnacing bath.

* * *

Gas heated muffle type furnaces have the advantage of being able to produce annealed wire which is free from baking or soldering of the waps. This is especially advantageous where a free-running end is required to run off at high speed as in the modern spring winding machines which feed netting weaving looms. This freedom from baking is due to the coils entering and passing through the muffle separately each on its own supporting tray. The furnace consists of a long heat resisting muffle, three quarters of which is enclosed in refractory fire brick, the remaining quarter acting as a cooling chamber at the exit end of the furnace. The enclosed portion is heated by a series of gas jets which are graded in size to give the greatest heat input at the entrance end of the muffle. Each gas jet has a corresponding air jet bringing in a supply of pre-heated air. Temperature control is effected by regulating through synchronised valves the flow of gas and air to the burners, and it is recorded by two pyrometers set at the entrance and exit ends of the heated muffle. These pyrometers are connected to a recording chart by compensating leads.

* * *

The wire to be annealed is loaded by a small electric hoist on to a wooden ramp from which leads a gravity conveyor to the front end of the muffle. The coils slide down the conveyor and fall one at a time into a cage holding a mild steel tray which acts as a bearer for each coil during its passage through the muffle. At a pre-determined time a warning bell rings and an electric motor is set in operation. This is geared to a horizontal ram which drives forward and pushes the tray holding the coil into the muffle. As the ram starts to move forward it operates a cam which depresses a lever and opens the muffle door. When the ram has reached the limit of its forward movement it operates a reversing switch; this reverses the

driving motor, withdraws the ram and allows the muffle door to fall again into the closed position.

* * *

As each coil enters the muffle the complete line of supporting trays moves forward and the end one in the cooling chamber is ejected down at sloping chute terminating in a water tank which acts as a gas seal for the open end of the chute. Immersed in the water tank is a power operated cage similar to the one at the entrance end of the furnace. As each annealed coil is ejected, it hits a trip switch in the base of the water tank. This causes the cage to rise out of the water and to eject the coil on to a gravity conveyor from where it is taken and stored ready for despatch. Half-way down the sloping chute is a stop-bar which halts the downward progress of the supporting tray without interfering with the progress of the coil. The tray now rests on a manually operated trap door which when opened ejects the tray on to another gravity conveyor which returns it to the front end of the furnace ready to receive another coil.

* * *

A protective atmosphere is provided inside the muffle as follows. A controlled amount of town gas and air is burned in a metal chamber lined with refractory material. The burned gas is passed through a series of columns cooled by water which removes any excess water vapour. The gas is then pumped through a 1½" pipe leading into the exit end of the muffle. Combustion of gas and air is so regulated as to produce an atmosphere containing 11% to 12% carbon dioxide. This produces a slightly oxidising condition which facilitates subsequent pickling of the wire ready for galvanising after it has been woven into netting.

* * *

This type of furnace is most suited to the annealing of 12" diameter coils of approximately 1-cwt. each. A typical specimen of this furnace holds 18 coils in the heated muffle and 6 coils in the cooling chamber. The timing mechanism controlling entry of the coils into the muffle is set at 7 minutes so that the total time for a coil to pass through the furnace is 24 x 7 minutes, or 2 hrs. 48 minutes. The life of a set of trays is only about 4 months, by which time they become so distorted as to cause cockling inside the muffle. The life of the muffle varies from 12 to 18 months, and the installation of a new one invariably necessitates a complete rebuild.

* * *

The most modern type of furnace used for batch annealing is the electrically heated "top-hat" type. These vary in size but their construction is fundamentally the same, viz. a steel outer casing lined with insulating material, then an inner lining of refractory firebrick to which are pinned a series of ribbon type electrodes. The electrodes terminate in a junction box leading to the main electrical supply. The older type of furnace has the conventional plug and socket arrangement but the newer type has a "V" shaped fitting at the base of the junction box which automatically plugs in to the electricity supply when the furnace is lowered into position. To ensure that the furnace is always located correctly, two guide posts are provided which enter metal sheaths fastened one on each side of the furnace. In my own firm the furnace ratings vary from 120 K.W. to 300 K.W. and all are designed to operate at a maximum temperature of 850°C.

* * *

A furnace normally operates on four hearths and to ensure continuity of production, the working programme is so planned that the cooling time of any charge does not exceed the combined furnacing times of the subsequent three charges. All the hearths are similar in design. Each one has a plinth of firebrick encased in steel which supports a ni-chrome throat plate standing on vertical legs. There is a hole in the centre of the throat plate and a high-speed fan is sited immediately below it. This ensures uniform distribution of heat during the heating and cooling cycles. The charge container is placed on the throat plate and a mild steel bell cover is lowered on to the hearth. The skirt of the bell sits in a narrow channel round the base of the hearth which contains a low melting point alloy similar to woods metal. Placed in the base of the channel is a hollow ring through which either steam or water can be passed. When steam is applied the sealing metal becomes molten and allows the bell to sit on the bottom of the channel and makes it completely gas-tight. When the furnace is in operation on any hearth the steam is turned off and water is turned on; the cooling effect of this offsets the radiated heat from the furnace and prevents rapid oxidation of the sealing metal.

* * *

The bell covers referred to above are fabricated from mild steel plate and have vertical seams only —except, of course, where the dome is welded to the side walls. They are shot blasted to produce a perfectly clean surface and then sprayed with aluminum to a depth of .012". They are subsequently heat treated at 750°C. before being put into general use.

* * *

The loading of material for this type of furnace depends largely upon its gauge; it can be annealed on single column coil carriers, multiple coil carriers or in metal baskets. The latter are composed of a nickel chrome frame with a lining of mild steel sheet. They have three equidistant lifting lugs and after loading are placed on the hearth one on top of another. (See Fig. 2).

They are used mainly for the finer gauges of wire but where the gauge is 24 or smaller, modifications have to be made to the container as follows. Three well spaced holes are drilled in the vertical wall on each side of the container and approximately 8" from the bottom. Another series of holes is drilled 8" above this one and so on, to the top of the container. A single layer of wire is put at the bottom of the container, then three heat-resisting bars are put through the first series of holes and a perforated nickel chrome plate is placed across them. Another layer of wire is put on this plate and the process is repeated until the container is full. The complete charge consists of several layers of wire, each independently supported, thereby obviating the possibility of baked and sticking waps. The normal annealing temperature of 720/730°C. is reduced to 645°C. for this type of product.

* * *

The thicker gauges of material such as bolt and chain wire in sizes ranging from ⅜" to 1" are usually annealed on single column coil carriers giving a charge weight of 28 to 30 cwts.

* * *

The intermediate gauges which form the bulk of production are in 22" and 18" diameter coils and are annealed on multiple coil carriers, giving a charge weight varying from 3½ to 5½ tons. The 22" coil carriers consist of a round steel base with three vertical perforated columns hollowed on one side to permit the removal of the ram truck pole after the wire has been placed in position. The 18" coil carriers have the same circular base but with four vertical perforated drums into which the wire is placed. Loading of these coil carriers is carried out by placing the carrier on to a horizontal platform which has guide pegs and securing clamps for holding it in position. The platform is then tilted hydraulically until the vertical legs of the carrier are brought down into a horizontal position. The wire is then placed on the carrier by means of a battery driven fork-lift truck which has had the lifting fork removed and a horizontal boom put in its place. After loading the platform is returned to its original position, thus bringing the loaded coil carrier back to a vertical position. It can then be picked up by overhead crane and placed on the hearth ready for annealing. Unloading of annealed charges is carried out in the reverse order to that just described. (See Figs. 3 & 4).

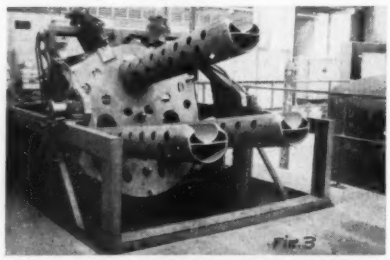


Fig. 3

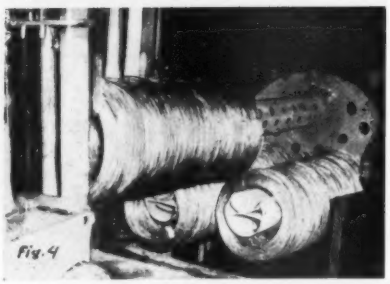


Fig. 4

The varying types of wire naturally require varied annealing procedure and this can only be determined by the gauge and quality of the wire, the total weight of the charge and the finish required by the customer. Plain low carbon steels can generally be annealed at 720/730°C. with a soaking time varying from half-hour to one hour according to the weight of charge. Exceptions to this generalisation are many and one has previously been quoted, where the annealing of very fine wire is carried out at a reduced temperature of 645°C. Going up the temperature scale, rolled flat strip is annealed at 750°C. and soaked for three hours because of the density of the charge when loaded on to a multiple coil carrier. Medium and high carbon steels are treated differently from low carbon steels. They are usually annealed at 710/720°C. and soaked for periods varying from 1½ to 3½ hours, according to the composition of the steel. Invariably the furnace is switched off at the end of the soaking period and the charge allowed to cool slowly to 680°C. The furnace is then removed and the charge allowed to cool normally to the required discharge temperature.

* * *

Certain high carbon steels are subjected to a form of heat treatment known as "spheroidisnig". This comprises heating the steel to a temperature and for a period long enough to cause the constituent cementite to form microscopic balls or spheroids. The cementite is so affected whether existing free or together with ferrite in the form of pearlite. This type of structure can be obtained by heating a hyper-eutectoid steel to a temperature just below its lower critical point and soaking for a prolonged period. The charge is always cooled slowly until the eutectoid point of 680°C. is reached.

* * *

The type of finish specified by a customer is achieved by means of the discharge temperature, assuming that at all times the charge is protected by a neutral atmosphere. Wire required with a blue finish is discharged at 350°C. but bright annealed wire is allowed to cool to 120°C. A "straw" appearance is produced by exposing the charge at 200°C.

* * *

An examination can now be made of how these different finishes are produced. As soon as steel is heated in a furnace, its surface is acted upon by the atmosphere it encounters there. If a charge of wire were left surrounded by air the oxygen in the air would combine with metallic elements in the wire's surface and form a crust or scale of oxide. This oxidation would in most cases be prejudicial to the finished appearance of the wire. Obviously then, to avoid oxidation as much free oxygen as possible must be excluded from the atmosphere. To do this it is necessary to produce a neutral gas and inject it into the atmosphere surrounding the charge. The air is then removed by dilution with the protective atmosphere. The common sources of these neutral atmospheres are Town gas and anhydrous ammonia, and it is the plant required for the production of the latter which will be described.

* * *

If a mixture consisting of 75% hydrogen and 25% nitrogen is compressed and passed at high pressure over a catalyst, the hydrogen and nitrogen combine to form ammonia. Conversely, if ammonia gas is passed over a catalyst at a high temperature and low pressure, the combination between the hydrogen and nitrogen is broken down, i.e. the ammonia is cracked or dissociated and the result is a mixture of 75% hydrogen and 25% nitrogen.

* * *

Ammonia is available in liquid form in large cylinders each holding about 540 lbs. It vaporises and is fed through a pressure reducer to a catalytic cracker which is thermostatically controlled at a fixed temperature of 530°C. Here it is dissociated and the cracked gas passes via a control valve to a burner unit where it is mixed with a controlled amount of air and burned. The combustion products pass on through a mixing plate to a set of catalytic copper gauzes which promote the removal of the final traces of oxygen in the burned gases by combination with the copper. (See Fig. 5). It is important that the burner gauze temperature be maintained at 500°C. to 530°C. It is possible to control the temperature by controlling the respective amounts of cracker gas and air. Obviously an increase in air would promote fiercer combustian and a higher temperature. It is desirable to control combustion to produce a final gas containing approximately 92% nitrogen and 8% hydrogen. The percentage of hydrogen is recorded on a katherometer.

* * *

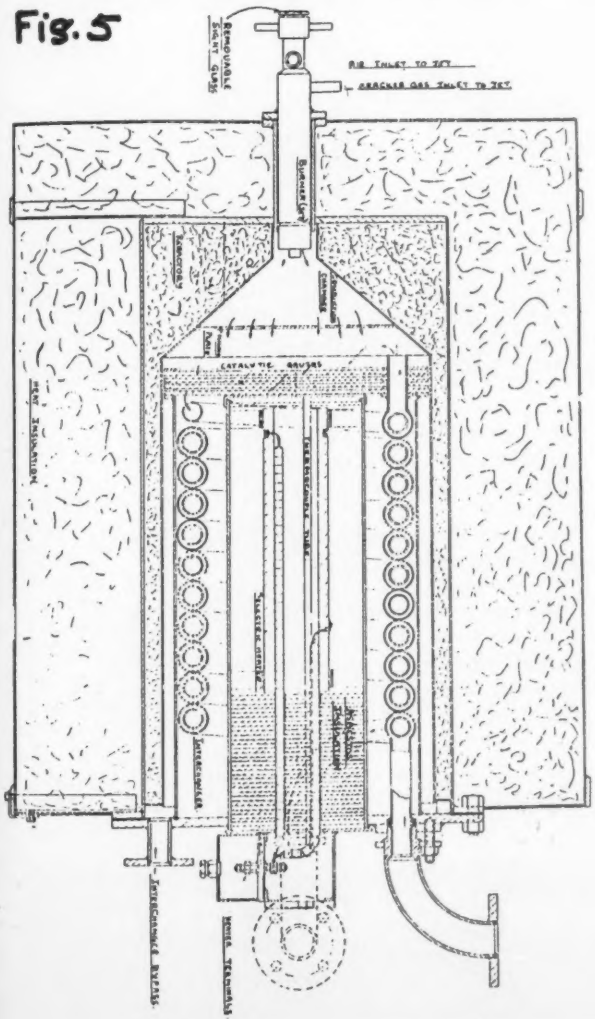
This gas then passes through the inner annulus of two concentric tubes to a cooling coil where water vapour is condensed. The gas is saturated at cooling water temperature, water vapour having been produced during combustion by a combination of hydrogen and oxygen. The gas is then ready for use and flows along a main feed pipe which has extensions to each hearth allowing each one to be fed separately. The piping system to and from each hearth is fitted with a two-way valve which permits the flow of return gas to be fed to a gas holder or into a separate line leading out into the atmosphere. The latter is only in use when a charge is being purged, i.e. when the air inside the bell is being diluted by neutral gas, this process taking approximately one hour.

* * *

Apart from the purging periods, the gas is returned to the gas holder. During its use on the hearths, it has become contaminated by waste matter produced by the cracking of drawing lubricant on the wire; it is therefore passed through a series of filters containing cotton wool and activated charcoal. The cotton wool removes the larger particles of oil mist and the charcoal absorbs the finer particles missed by the cotton wool. On leaving the filters the gas returns to the burner unit where it passes along the outer annulus of the concentric tubes, picking up heat in doing so and returns to the mixing plate where it is regenerated. This completes the cycle. (See Fig. 6).

(*Please turn to page* 248)

Fig. 5



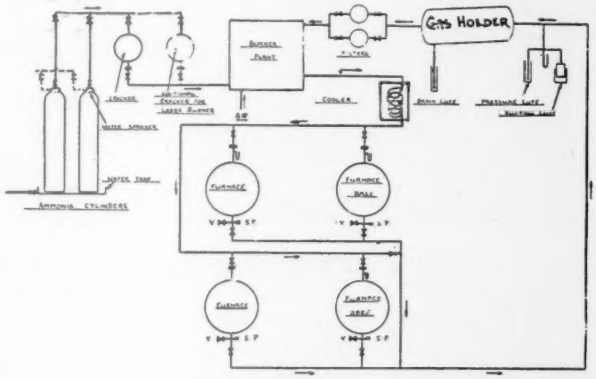


Fig. 6

LINE DIAGRAM OF TYPICAL INSTALLATION OF REGENERATIVE AMMONIA BURNER WITH BELL TYPE FURNACES

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In this department will be published helpful hints on how to do things and the questions asked by our readers on wire processing problems, together with the answers and comments thereon received from the field. In no instance will the identity of the persons asking for advice or of those supplying it be published.

Our readers are invited to send helpful contributions and to submit questions on their technical problems to the Editor. These will be answered from information on hand or from the field, when it becomes necessary to secure counsel from that source.

Stainless Steel Wire Drawing

Question

We are experimenting with the drawing of stainless steel wire and would be grateful for added information.

* * *

Our raw material is rolled 0.212" diameter 18/8 stainless steel rod. As cost precludes cleaning by the sodium hydride process, the rods are immersed for about 20 mins. in a 10 to 15% H_2SO_4 solution at 90°C and followed by a high pressure water rinse and immersion in a cold 50% HNO_3 bath.

* * *

Our main problem has been the application of the lubricant carrier coating. We dip the rods in a hot dilute solution of lime, followed immediately by a quick immersion in a hot saturated solution of NaCl. The rod is then allowed to dry thoroughly in the sunshine. This resultant coating permits only two drafts before it has to be renewed and we feel that a more efficient coating procedure is possible.

* * *

In conjunction with the CaO-NaCl coating we use dry powdered soap as the drawing lubricant. Although we have experimented with various light mineral oils and MoS_2, we feel that the soap is the more effective lubricant.

* * *

Dies used are standard tungsten carbide types used for drawing brass wire, and drawing speed is approximately 360 feet per minute.

* * *

Can you supply information on the following points?

1. **Method of Cleaning Rod**

Composition of pickling solutions, immersion times, temperatures, etc.

* * *

2. **Lubricant Carrier Coating**

Solutions used, concentrations, immersion times, temperature, drying, etc.

* * *

3. **Drawing Lubricant**

Material used and its consistency.

* * *

4. **Dies**

Materials, contours, etc.

* * *

5. **Drawing**

Recommended speeds and drafting data.

Answers

Reply No. 1:

1. An outline of the method used in our plant would probably be of little worth inasmuch as cleaning is done by the sodium hydride process — a method which you consider too costly. Little acid pickling is required to effect a clean surface with the hydride process. However, we do use a sulphuric acid tub as well as a nitric-hydrofluric acid tub in conjunction with the hydride. The sulphuric tub has a concentration of about 10 to 15% and is maintained at a temperature of 160°-180°F. Rods are pickled for about 10 minutes or more in this solution—then rinsed with a pressurized water spray.

This is followed with pickling in a solution of 4% to 8% nitric acid and about 1% hydrofluric acid. The tub is heated to 150°-170°F. Coils are immersed in this tub for about ten minutes and again pressure rinsed.

2. It is our practice to use a lead coating when rods are to be given a reducton with multiple passes. Coils are immersed in a tank of molten lead maintained at 700°F-800°F., removed and quenched in a tank of water.

A lime coating is used with rods when only one or two drafts will be taken. Smaller wire diameters, of course, can be lime coated and tandem drawn. Depending on the type of lime coating desired, its concentration may vary from 2 to 5 ounces per gallon. The lime tub is maintained at a temperature of about 180°F. Coils are spread on a yoke for liming and blown dry with compressed air when removed from the lime tub.

Since we have never used NaCl in conjunction with lime, I cannot comment on this practice.

3. We have found that a metallic-stearate soap lubricant has performed best in our wire drawing operations. There are a number marketed and we use them as supplied by the manufacturer.

4. All of our dies have a tungsten carbide nib mounted on a steel case. The die angle is maintained at about 15 degrees.

5. Depending on the amount of draft, wire diameter, etc., drawing speeds will generally vary from 200 to 500 feet per minute. With tandem wire drawing, of course, the first draft is taken at a relatively slow speed and speeds are progressively increased with successive drafts. With 5-6 hole tandem drawing, it is not uncommon to finish at speeds of from 300 to 500 feet per minute.

Where the design of drawing equipment permits, we prefer a relatively heavy reduction with

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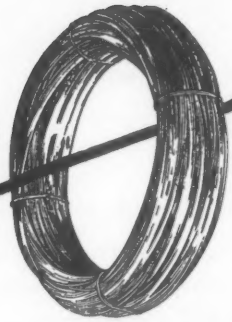
Wire Kinks



the first draft and progressively lighter reductions with successive drafts. For instance, the initial draft might be a reduction of 35% to 40% and the finishing draft in the order of 10% to 15%. With tandem drawing from the rod, the total reduction may approach 80%.

Reply No. 2.

Below are my comments for your reader in South Africa. I am also sending this letter on to Jeff for possible further comments.

1. I believe the use of hydrofluoric acid would be helpful, with other acids.

2. It would seem to me one of their main problems lies in this area. First of all, I do not believe I have ever heard of sodium chloride being used as a carrier. Secondly, if they are using a dilute solution of lime, it should be changed to a more concentrated solution, perhaps several dips with drying in between of an 8% suspension of lime.

We supply several companies drawing stainless steel wire, W Coating, which is a borax base compound. We enclose our data sheet. Also used in our C Coating Compound, data sheet also enclosed.

3. We enclose our description of "STEELSKIN" #120 drawing powder, which I believe would be of interest to them.

4. These should be of tungsten carbide and probably should be of angles other than those used for brass.

5. Here again, I cannot add too much. I would think this would be dependent to a certain extent upon their own machine set-up.

Reply No. 3.

This is in reference to your letter concerning your South African reader desiring information on Stainless Steel Wire Drawing.

Assuming that you have requested the information on items 1, 2, 3, and 5 from other sources, I will attempt to answer item #4.

We recommend Firth Sterling R6 dies with 2"x1-⅛" forged casing grade H13 carbide with 75% bearing length, 16 degree included angles. We recommend the intersection between the bearing and angle be kept as sharp as possible. The angle should be polished on polishing machine, to be held as nearly perfect as possible, the sizing should be last operation on die and no blending after sizing bearing.

Item 5, drawing speeds and drafting practice is dictated to a great degree by equipment. 30 to 40% reduction of area per draft is normal procedure.

Reply No. 4.

The general construction and contour of carbide dies used for drawing stainless is essentially the same as that for steel. Draft angle is 15°-16°. Bearing length is 66% of diameter. It is recommended that the back relief be somewhat longer than that for steel.

Carbides are being used consistently for drawing stainless down to .025 diameter. The practice on speeds is to draw at about one-half the speeds associated with steel wire drawing. Our own grade recommendation is 55A for the large sizes and 779 and 44A for fine wire.

It is our practice to refer specific questions regarding die lubricants to lubricant suppliers who are more qualified to provide these answers. Our information is that a heavy-bodied lubricant is required for stainless. Cowles soap is being used successfully in stainless wire drawing.

Reply No. 5.

In response to your letter I will answer the South African reader's questions in order.

#1. Method of cleaning rod and/or wire: Generally the sodium hydride process is used. However, as the letter states, the sodium hydride process is more costly than the writer wishes to be involved with. His method of cleaning is satisfactory if closely controlled, particularly with the thought of hydrogen embrittlement.

#2. Lubricant carrier coating: A coating of Standard S-C of 14 oz. per gallon, 200° Fahrenheit, then air dry, then two more quick dips, air dry, then dip in a heavy lime 10 to 12%, remove, air dry, and again immerse in the heavy lime tub, remove, and air dry.

#3. Drawing Lubricant: Number 55 and our number SWL are both widely used in the drawing of stainless steel, rod and wire, in the United States. Both of these materials are used to draw wire down to .031. In the past year we have several new customers using our EP lubricant #567 or #577 and while these cost considerably more than the two aforementioned lubricants these customers feel that the difference in cost is well worth while.

#4. Dies: Generally, R-6's or R-7's are used both for rod ripping and intermediates. The dies are designed with a very full bell, and eight to ten degree included approach angle, a maximum 25 percent bearing and a full back relief with all meeting points blended. These dies are water cooled.

#5. Drawing: This will set forth an example of wire drawing and speeds generally considered com-

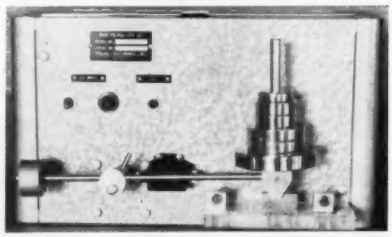
(Please turn to page 249)

Abrasion-Scrape Tester

Conforming to MIL-W-19583 (Navy) requirement to determine Abrasion Resistance of film-insulated high-temperature magnet wire, Peschel Model TS-2 Abrasion-Scrape Tester is a device that repeatedly scrapes the wire with the cylindrical surface of a #11 steel needle. The length of the scrape motion in one direction is 3/8 inch, and the distance from the scraper head to the eccentric driving mechanism is approximately 6 inches. The frequency of the scraper is 60 strokes per minute. The device is equipped with an electrical circuit providing 12 volts at approximately 5 milliamps between the needle and the wire sample. The electrical circuit is so designed that failure is detected and the device shut off when the film is worn through to the copper for approximately 1/3 of the stroke length. A mechanical counter indicates the number of strokes which were required to abrade the wire sample.

* * *

The Abrasion-Scrape Tester, shown below, is mounted in a small metal cabinet. Necessary controls and pilot lamp are mounted on the front panel. A complete set of precision ring-type weights of brass, chrome plated, is supplied to enable loading the scraper head with any value from 100 to 1200 grams. The exact load is specified



in accordance with wire size, type and class of insulating film.

* * *

Input is standard lighting circuit, 115 volts, 60 cycle, single phase. The metal cabinet measures 14"x8" high x10½" deep.

* * *

For further details, write **Peschel Electronics, Inc.**, Towners, Patterson, N. Y.

Florida Using Aluminum On New Causway

Four miles of aluminum chain link fence along the brand new 36th Street Causeway between Miami and Miami Beach highlight a pacesetting area use of aluminum road, bridge and electrical products by the Florida Road Department.

* * *

Said to be one of the longest aluminum chain link fences in the southeastern U. S., it joins a variety of other aluminum uses along the $14 million dollar causeway, according to **Reynolds Metals Company**, supplier of most of the aluminum for the project.

* * *

The new causeway also features almost two miles of aluminum bridge railing, 270 tapered aluminum light standards and over 22 miles of aluminum electrical conductor. In addition, aluminum signs, both of the post and panel type and large road-spanning type, are used here as elsewhere on Florida highways.

LEGEND LARGE AND CLEAR ON INSULATED WIRE SURFACES — USE GILLIES MARKING

GILLIES CONCAVE AND FLAT MARKING WHEELS PRINT YOUR

WHEELS AND MACHINES FOR BEST WIRE IDENTIFICATION

MARKING WHEELS and MACHINES for ELECTRIC WIRE

THE BEAUTIFUL TOWN OF WEST BOYLSTON, MASSACHUSETTS WELCOMES INDUSTRY. INQUIRE FROM US.

U. S. Patent #2898848 & 2898849

Gillies Engraved Concave and flat marking wheels are widely used printing the I.P.C.E.A. color code, numerical, semi-spiral striped, dating, or manufacturer's identification, etc. on insulated wire, tubing or hose.

Machines print on ONE or BOTH SIDES in large legible letters. Wheels are adaptable to any machine—or we will supply the machines.

Wheels, shafts, ink pans and all accessories are readily removable for quick and easy cleaning.

Wheels are made of TOOL STEEL, HARDENED to Rockwell test 61-64 and HARD CHROME PLATED.

Send for samples of wire and prices on wheels and equipment.

"There is no substitute for QUALITY when combined with SERVICE"

DUNCAN M. GILLIES CO., INC.

P. O. BOX 181, WEST BOYLSTON, MASS.

Telephone: TE 5-4445

Two New Silicones Available

Silicones Division, Union Carbide Corporation, has announced it has placed on sale two new types of low shrink silicone rubber stock for cable and wire insulation.

* * *

The first is "Union Carbide" K-1347 Silicone Rubber Compound, a premium grade material with superior physical and electrical properties for high quality wire and cable insulation, under conditions of exposure to extreme hot and cold temperatures. It is designed for use on wire to meet military and industry specifications. It can be continuously vulcanized on conventional equipment, with either steam or hot air. It is supplied in sheet form in 25 and 50 pound cartons.

* * *

The second is "Union Carbide" K-1357 Silicone Rubber Compound, which is available in coiled strips for direct feed to the extruder. It also can be cured in either steam or hot air. K-1357 gives excellent electrical and physical properties at moderate cost, in addition to affording savings in the fabrication process.

* * *

Both compounds are white in color, and can easily be color-coded to desired shades.

Borden Catalog of Resins, Adhesives, Etc.

A new 36-page product catalog and directory has been issued by **Borden Chemical Company.** The catalog lists specifications, end-uses, and other technical data for the more than 1000 products manufactured by the company.

* * *

Borden Chemical industrial and consumer products are reviewed in the general areas of basic chemicals, monomers, polymers, resins, adhesives, coating materials, plastic products, fine chemicals, organic intermediates, and bio-chemical reagents.

* * *

For a copy write Department H, The Borden Chemical Company, 350 Madison Avenue, New York 17, N. Y.

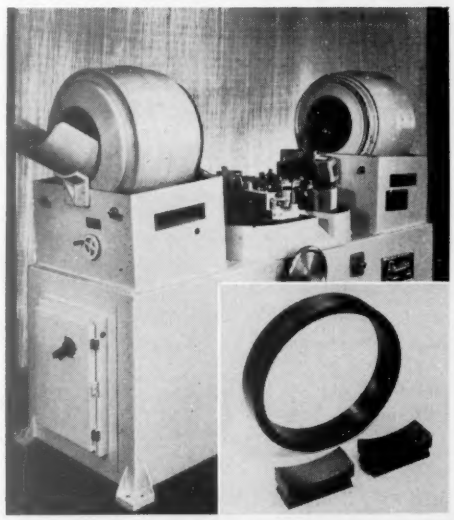
Planetary Thread Rolling Machine

Rolls Screws, Bolts and Nails

400 TO 800 PIECES PER MINUTE

CAN CUT COSTS 65%
IMPROVES QUALITY
STEPS UP PRODUCTION

CUTS COSTS...



Prutton Planetary Thread Rolling Machine
Model 125A-24

When you stop lost motion you start cutting costs. That is the basic idea behind Prutton's Planetary die system. This Model 125A-24 Prutton Thread Roller produces 400 to 800 threaded parts per minute—class 3 fit. It easily handles thread rolling; roll forming; knurling; serrating and necking. It rolls diameters .090 to 5/16" and can apply threads up to 3 inches long. Special models handle blanks up to 8 inches long.

Die life of five million pieces is not unusual because the Prutton Planetary Die has 36 inches of working surface. Conventional machines would require a five foot stroke to handle equivalent die area. But, the Prutton Planetary Die measures only 12 inches across and the entire machine occupies a mere 18 square feet of floor space. One Prutton can replace four or more conventional machines.

Write or Phone for Cost Saving Information, TODAY!

Prutton
CORPORATION
5295 WEST 130th STREET
CLEVELAND 30, OHIO

Leader in Planetary Thread Rolling

JUST PIN THIS COUPON TO YOUR LETTERHEAD

PRUTTON CORPORATION
5295 W. 130th Street
Cleveland 30, Ohio

Please send information on Model 125A-24 Thread Rolling Machine.

Name ..... Title .....
Company .....
Street Address .....
City ..... Zone ..... State .....

Wire Men Who Want **Reel** Service

Call APCO MOSSBERG *First!*

Any size, any shape, any time! Apco Mossberg steel reels, spools and bobbins are designed exactly the way you specify, delivered on the day you specify.

Whether it's for drawing, stranding or any other type of processing . . . each Apco unit is custom-made to extremely close tolerances to run true without wire breakage or trapping. Each keeps machine downtime to the minimum . . . gives you a steel-strong, easy-spooling production package that pays off in on-the-line economies.

Tell us your wire or wire handling problems. Apco's engineers, experience, and 50 years of reel service will come up with an answer that makes real sense. Write, wire or phone collect.

PACIFIC COAST REPRESENTATIVE:
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Ferry Building
San Francisco 11, California

CANADIAN REPRESENTATIVE:
Hugh P. Williams & Co.
47 Colburne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

To Sell Fiber Glass Yarns

Pittsburgh Plate Glass Co., producers of Fiber Glass Yarns, has entered into an agreement with **L. P. Muller & Co.,** Philadelphia, Pa., whereby the latter will sell these yarns to insulated wire manufacturers on a nation-wide basis. The company previously represented Pittsburgh in selected areas.

* * *

John H. Clark, who had been Pittsburgh Plate Glass Company's Manager of Electrical Product Sales, has joined the Muller organization to head the staff that will serve the electric wire and cable industry.

* * *

Mr. Clark brings to Muller an experience of 17 years in electrical fiber glass sales and he will be the liaison man between Pittsburgh Plate Glass and his present affiliation. Pittsburgh recently announced that its Shelby, N. C., facilities will be expanded to enable it to increase its present production by 50 percent.

Giant Furnace Mock-Up

The Lee Wilson Engineering Company, Inc., Cleveland, recently completed an actual size segment, complete in all detail, of their revolutionary new opened coil method of annealing.

* * *

The mock-up was fabricated mainly of plywood and is used both for engineering and sales purposes.

* * *

The huge furnace section has aided greatly in expediting engineering of this new annealing system.

* * *

The mock-up stands on a concrete pad adjacent to the Lee Wilson offices.

Greening Issues Book Commemorating Centennial

The B. Greening Wire Company Ltd., of Hamilton, Ontario, has published a book commemorating its One Hundredth Anniversary, entitled "Oh Christopher!"

* * *

The title is derived from one Christopher Greening, whose name

is found in the histories of wire making as far back as 1494—two years after Columbus discovered America.

* * *

A long line of Greenings were identified with the manufacture of wire, one, **Benjamin Greening** (1808-1877), wishing to retire at the age of 50, emigrated to Hamilton in 1858. He became involved in the business again and organized the **Victoria Wire Mills** in 1859,

Three generations of Greenings, active in present operations. Left to right: H .B. Greening, Jr., seated H. B. Greening, chairman of the board, S. O. Greening, recently appointed president. * * * * * * * * *

which in 1889 became The B. Greening Wire Company Ltd.

* * *

The first operations included the manufacture of wire cloth, wire screens and wire rope. This has been extended over the years to include the drawing of many types of wire and the production of numerous wire products.

* * *

The Company presently is headed by **Mr. S. O. Greening,** President, with **Mr. H. B. Greening,** serving as Chairman of the Board.

New Tubing Plant Opened By Reynolds

Reynolds Metals Company has announced the completion of one of the aluminum industry's largest and most efficient drawn tubing facilities in a new 30,000-square-foot addition to its Bellwood Extrusion Plant, costing in excess of $500,000.

* * *

A new drawbench installed is more than 200 feet long and can produce five tubes at a time at speeds up to 400 feet per minute and in lengths of more than 85

For Fungus Resistance, Specify

TEXTILENE TWI-TAR

Offering great durability along with light weight, Textilene Twi-Tar is successfully used for buried communication cable (bedding and overall serving), expanded ACSR cable (expander between core and conductors), stationary power cable and portable cables.

Twitchell's superior Textilene line also includes: Moisture-resistant fillers — *Twi-Flex* and *Twi-Wax*. Used for non-metallic sheathed cable, maritime shipboard cable, varnished cambric cable.

Soft, dry fillers — *Twi-Port* and *Glascor** (Fiberglas-centered for high tensile strength without added bulk). Used for control, power, appliance, coaxial and communications cables, and all types of portable and flexible cords.

*Patent Applied For

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

Third and Somerset Streets, Philadelphia 33, Pa. • REgent 9-7800

PAPER PRODUCTS FOR THE WIRE INDUSTRY

Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven

EFFICIENT, MODERN SYSTEMS FOR ELECTRICAL WIRE & CABLE MANUFACTURING

• ***CABLE LACQUERING SYSTEMS***

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• ***WIRE ENAMELING SYSTEMS***

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• ***ASBESTOS INSULATING SYSTEMS***

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008″ to .040″ thickness in a single pass.

• ***RUBBER OR PLASTIC JACKETING SYSTEMS***

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

• ***GLASS & VARNISH COATING SYSTEMS***

Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• ***SELF TRAVERSING REEL CORD DRYERS***

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES UPON REQUEST

C. A. LITZLER CO., INC.

235-239 BROOKPARK ROAD

CLEVELAND 9, OHIO

feet. The equipment, manufactured by **Vaughn Machinery Company**, Akron, Ohio, is said to be the most advanced in the industry.

New Bulletin Details Scovill Cold Heading Wire

Extruded Cold Heading Wire (Cartridge Brass, 70%) is produced by **Scovill Manufacturing Company** from billets made by their unique Continuous Casting Process. Continuous casting is followed by hot extrusion and final cold drawing and annealing to closely controlled tempers. Continuous Casting is said to assure a more uniform material. A more ductile alloy is said to result from 5% higher copper content than usual for cold heading wire. Bulletin describes applications and advantages, lists available stock tempers, gives characteristics of the material and specifications. District sales offices and stock depots are also listed. Free on request to Scovill Manufacturing Company, Mills Division, 99 Mill St., Waterbury 20, Conn.

New Sales Set-up for Okonite, Kennecott and Chase Brass

In a joint statement, **C. M. Kirkland**, Vice President-Marketing of **The Okonite Co.**, Passaic, N. J., and **G. B. Moseley**, Vice President in Charge of Sales at **Chase Brass & Copper Co.**, Waterbury, Conn., a change in the marketing of wire and cable products manufactured by **Kennecott Wire and Cable Co.**, Phillipsdale, R. I., which is now a division of Okonite, has been announced.

* * *

Effective November 1, 1959, The Okonite Company assumed responsibility for the sales of Kennecott Wire and Cable Division's products. In the past, most of these copper wire mill products were marketed through the Chase Sales force.

Chase Brass & Copper Co., along with its complete line of brass wire mill products, will continue to supply certain customers such as makers of nails, cold headed products, roofing products, strainers,

and fasteners with bare copper wire made by Kennecott, and will continue to make and supply a complete range of sizes and types of copper bus conductor in flat and tubular form for the electrical industry.

Booklet on Aluminum Conductors

"Overload and Fault Current Limitations of Bare Aluminum Conductors" — the second portion of a long-range engineering data project of Aluminum Company of America — has been published by Alcoa.

* * *

Information presented in the report includes description of fault and overload currents, along with graphs showing maximum allowable time for various high value emergency or short circuit currents, in utility transmission or distribution lines. Graphs for both stranded aluminum conductor and A. C. S. R. are included.

* * *

Particular value of the new Alcoa publication is to electrical utilities, where it will provide the necessary data to determine fuse selection, or circuit breaker or relay settings, for various conductor sizes and applications.

* * *

The 16-page booklet comprises section seven of "Alcoa Aluminum Overhead Conductor Engineering Data." The several sections of the project are being published as research is completed, not in the numerical sequence they will have in the completed project series.

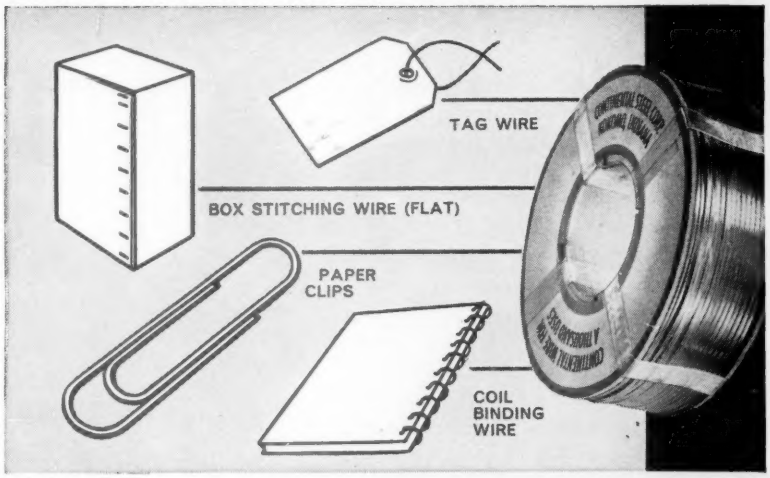
* * *

This report may be obtained from any Alcoa sales office or from 792 Alcoa Building, Pittsburgh 19, Pa. Also available is the first of the reports, Section Six: "Current-Temperature Characteristics of Aluminum Conductors."

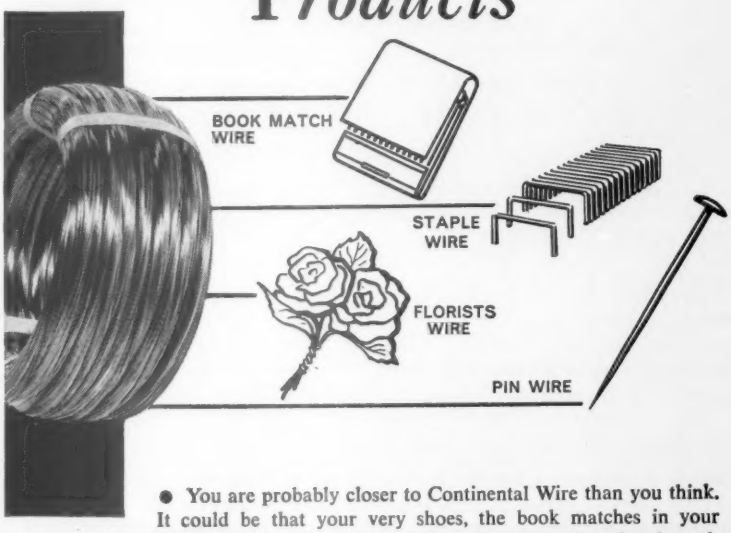
New Strip Welder

National Electric Welding Machines Co., Bay City, Mich., has announced a new automated strip welder capable of operating with a fast-moving strip mill tin plate coil inspection or annealing line.

* * *



Fine and Specialty Wire for Super Fine Products



● You are probably closer to Continental Wire than you think. It could be that your very shoes, the book matches in your pocket or the paper clips in your desk—were made using dependable Continental Fine Wire! That's because Continental is preferred by hundreds of leading firms for literally thousands of different fine wire applications. For super fine products—you, too, should try Continental Fine and Specialty Wire, available in many sizes, of almost any temper, finish or analysis, in low carbon and medium low carbon steels.

For the finest in fine wire—call in Continental!

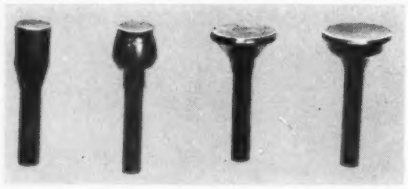
CONTINENTAL

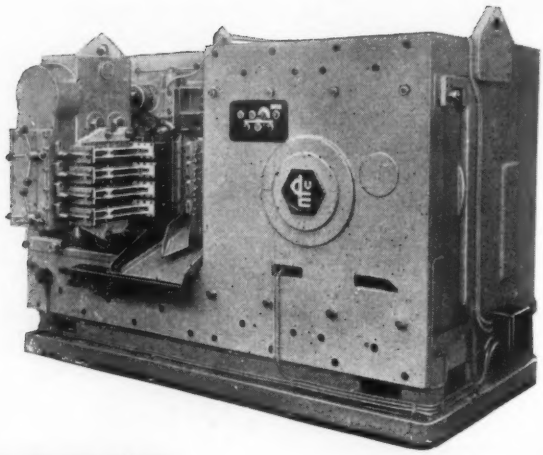
STEEL CORPORATION • KOKOMO, INDIANA

Wire Specialists for over half a Century

PRODUCERS OF: Manufacturers' Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence, and other products.

COLD FORMING DIFFICULT PARTS...





WITH THE

BOLTMASTER

Hexagon Socket Screws, Shafts with Geared Shoulders, Hexagon Head Bolts, Shoulder Screws, Engine Valves and bolts having 5 different diameters are normal applications for these German built cold forming machines.

★ ONE WORK CYCLE—permits completion of very intricate parts

★ PRESSING DIES AT 4 WORK STATIONS—conveniently arranged "getatable" position

★ WIRE FEED AT RIGHT ANGLES to the forming slide movement—blanks cut off by main slide eliminating separate cut-off mechanism

★ TRANSFER OF PARTS—by simple transport levers or permanent magnets. Whole mechanism can be swung aside making dies readily accessible

★ POSITIVE EJECTION in punches of 2nd and 3rd station standard equipment

★ 4 MODELS—capacities 3/8", 1/2", 3/4" and 1" bolts

Write or Phone ED 1-4858 for details!

Sold and Serviced in U.S. and Canada by

The BOLTMASTER Co.

Exclusive importers of Peltzer & Ehlers Machinery, Krefeld, Germany—builders of machinery for the Bolt Industry since 1888

21055 Lorain Road, Cleveland 26, Ohio

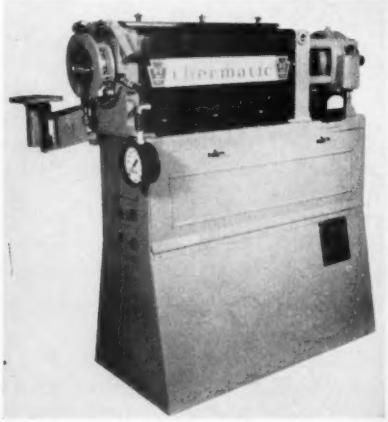
Through mash seam welding, it will provide a high strength, smooth joint with minimum build-up in thickness to meet needs of continuous strip mill operations.

* * *

According to National engineers, the unit will join maximum and minimum sheet widths and thicknesses automatically, in any of the normal strip mill combinations, on a 30-second sequence cycle at a welding speed of 30 feet per minute.

New D-S Small Extruder

A 1½" Thermatic* Extruder designed for laboratory and experimental production has been announced by **Davis-Standard, Div.** of Franklin Research Corp., Mystic, Conn.



The 1½" Thermatic, Model 15T, is designed for speeds up to 400 RPM and features production rates of 100 pounds per hour at 3000 PSI. Model 15T has separate, high-capacity thrust and radial bearings rated for an average life of more than a half million hours to provide long, trouble-free operation on a complete range of thermoplastic compounds.

* * *

This new model utilizes deep aluminum Therma-Fins* which provide excellent cooling for all requirements. Each heat zone along the barrel is equipped with a separate Therma-Fin and blower and is provided with a damper for infinite gradients of temperature control. Therma-Fins have cast-in

*Reg. Trade Name

heating elements for proper heating balance.

* * *

Complete specifications on Model 15T are available on Davis-Standard Catalog Section 3.12.

Introduces New Copper Plating Process

Hanson-Van Winkle-Munning Company has announced the availability of a new bright copper cyanide process, trade name of which is "Copper-Lume."

* * *

Copper-Lume has the following characteristics: Smooth, bright deposits over an extremely wide temperature and current density range; good metal distribution; solution simple to operate and control. Deposits can be buffed with ease, if required.

* * *

Bath constituents can include either potassium salts, a mixture of potassium and sodium salts, or sodium cyanide only. The deposits do not require activation before subsequent nickel plating.

* * *

In many respects, notably in its ease of operation, the copper-lume process is similar to H-VW-M's highly successful nickel-lume process.

* * *

More than three years' research and field testing were required to bring copper-lume to its present, final stage. For more information, write to Hanson-Van Winkle-Munning Company, Matawan, New Jersey.

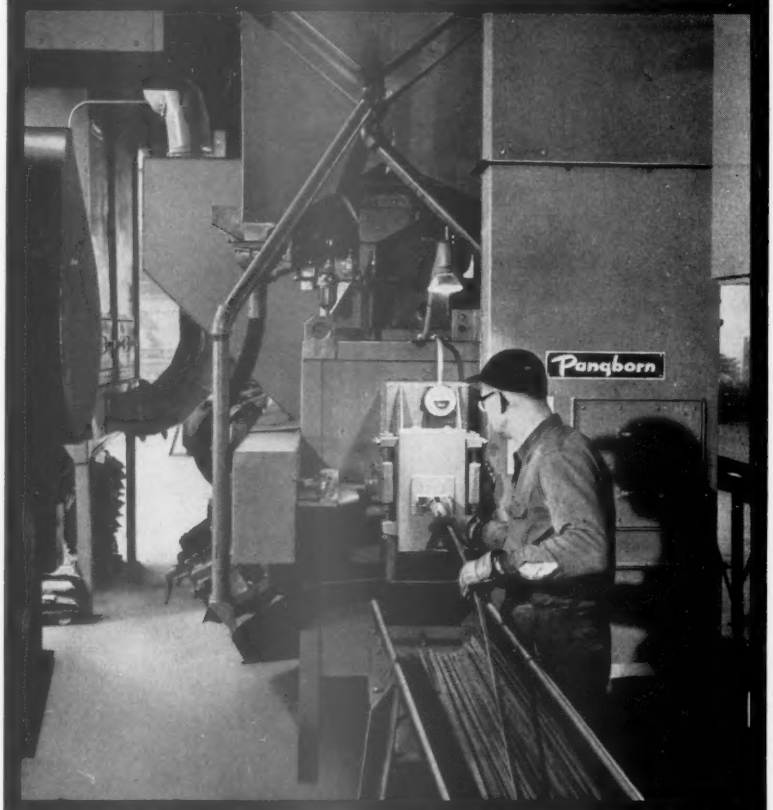
New Flat Stainless Spring Wire

A new flat form of precipitation-hardening stainless steel spring wire has been introduced by the **National-Standard Company,** Niles, Mich., offering the corrosion resistance of stainless combined with elasticity approaching music wire. The new wire, rolled from round 17-7 PH wire, has greater dimensional stability than music and spring wires. Stress-relieving hardening treatment produces insignificant dimensional effects.

* * *

Typical applications include hair

ROTOBLAST DESCALING SAVES $75 A DAY



Pangborn Rotoblast Descaling Machine makes cost-cutting automation possible at Bustin Steel

At Bustin Steel Co., Dover, N. J., hot rolled steel bars are descaled by a Pangborn Rotoblast Machine at rates up to 180 linear feet per minute. This speed of operation plus the perfect quality of work—eliminating oiling and degreasing operations later—permits inserting this Rotoblast Machine directly at the head of the production line, working toward a completely automatic manufacturing operation.

The operating cost of this machine saves Bustin at least $75 a day compared to pickling, *plus* the cost of degreasing *plus* savings resulting from longer tool and die life.

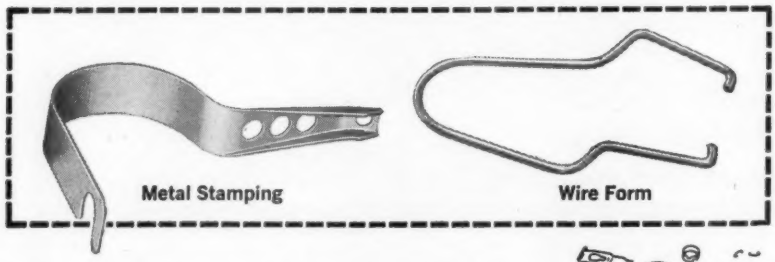
For information on how Pangborn Rotoblast can save *you* money, write PANGBORN CORP., 5400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment and Rotoblast Steel Shot and Grit.*

Pangborn CLEANS IT FAST WITH **ROTOBLAST**®

4 reasons why

Nilson Automatic 4-Slides are "Universal" Forming Machines

1. Form Wire or Ribbon Metal Stock
2. Accommodate Long or Short Pieces
3. Job Versatility through Quick-Change Cams
4. Combine Stamping & Forming in 1 Machine



Every Nilson Automatic 4-Slide is truly a "universal" forming machine, a machine designed to produce either wire forms or metal stampings at high production rates.

Open construction provides easy access to all tooling . . . permits rapid changeover from one stock to the other. And longer feeds, longer slide strokes give a Nilson the built-in ability to handle a wide range of work sizes — without special attachments or accessories.

For real efficiency in your pressroom, just pick the capacity you need from Nilson's 17 models of 4-slides! One of these versatile machines will make your stamping and forming operations faster, easier . . . and more profitable.

SIZE RANGES:
Wire up to ½" diameter
Ribbon stock to 3½" wide
Feeds up to 32"
5 TO 75 TON
PRESS SECTIONS

Write today for the
Nilson General Catalog
on Automatic 4-Slide Equipment

NILSON
THE A. H. NILSON MACHINE CO.
625 Bridgeport Avenue • Shelton, Conn.

AUTOMATIC WIRE & RIBBON METAL FORMING 4-SLIDE MACHINES • WIRE & STOCK REELS • WIRE STRAIGHTENING EQUIPMENT • AUTOMATIC STAPLE FORMING MACHINES • SPECIAL WIRE FORMING EQUIPMENT

clip springs, electrical timer springs, and sprinkler assembly clips.

* * *

The 17-7 PH flat spring wire is an alloy of chromium (16.00 to 18.00%), nickel (6.50 to 7.75%), manganese (1:00% max.), silicon (1.00% max.), aluminum (0.75 to 1.50%), carbon (0.09% max.), phosphorous (0.04% max.) and sulfur (0.03% max.). It is furnished annealed, one-fourth hard, one-half hard, three-fourths hard, or full-hard (Condition C) in bright or copper finish. Widths are available up to 0.300 inches. Minimum thickness is 0.009 inches. Modulus of elasticity is 29,500,000 in tension and 11,000,000 in torsion.

* * *

If more than one-fourth hard, flat 17-7PH wire can be hardened by heating for one hour at 900°F. Annealed can be hardened by the standard 17-7PH duplex heat treatment or the standard heat treatment-freezing operation.

Magnaflux Becomes General Mills Subsidiary

General Mills, Inc. has announced the purchase of Magnaflux Corp., Chicago, a pioneer in the development of techniques and equipment for detecting hidden flaws in metals.

* * *

The company, although now a subsidiary of General Mills, will continue its business as a separate entity and under its old name at its offices at 7300 W. Lawrence Ave., Chicago 31.

* * *

R. A. Wilson has been named president, W. C. Babcock is Magnaflux' new Vice president, and other officers and personnel remain unchanged.

Novel Use For Wire Cloth

The Reynolds Wire Division of National-Standard Co., Dixon, Ill., is supplying the **American Optical Company** with abrasives in grinding eye-glass lenses.

* * *

The cloth, made of .007" electrogalvanized steel wire woven to a 30x30 mesh, is employed to hold

an emulsified emery suspension between the lens and the "fining" tool. As all abrasive action takes place at the interface of the wire cloth and the lens, there is no wearing action on the tool.

* * *

The wire cloth plays a roll in the new "Integrated Surfacing System" recently developed by the American Optical Company, which

is said to improve tolerances, reduce fining time, cut tool costs, and eliminate human errors in the finishing operations.

Loma Enters Continuous Casting Field

Loma Machine Mfg Co., 114 E. 32nd St., New York 16, N. Y. has announced the development of a new continuous casting machine for casting copper billets and slabs.

* * *

The design of the machine, besides handling copper in all of its forms, lends itself to the casting of brasses, bronzes, aluminum and magnesium alloys. Shapes that can be produced on the unit include round piercing and extrusion billets, square wire bars and rectangular slabs, in capacities of 3 tons per hour for double strand casting of 3 inch diameter billets to 10 tons per single strand casting of 5½" x 33" slabs.

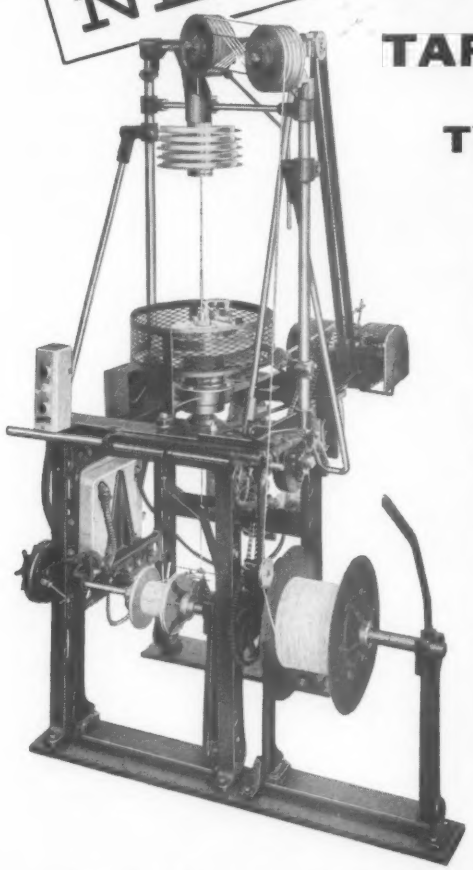
* * *

The machine is said to have exceptional versatility and to produce uniform, fine-grained sound structures, even in large cross sections. Full details will be supplied by Loma upon request.

NEW **WARDWELLIAN®**

TAPE SERVER

TYPE N.T.T.



for Teflon, vinyl, and many other types of tape within specification range.

- Serving head speed adjustable from 375 RPM to 1200 RPM, dependent upon character of material.
- Maximum diameter of flexible conductor ¼".
- Takeup adjustable for any desired lay with tapes up to ½" maximum width.
- Supply package 7" maximum diameter, 3" hole.
- Rate of production dependent upon width of material and angle of lay.
- Machine equipped with "Varidrive" motor.
- Machine operation fully electrically controlled.
- Serving head mounted on heavy duty ball bearings.
- Serving head can be operated clockwise or counter-clockwise.
- Machine equipped with new type multi-groove takeup sheaves and idler pulleys insuring a uniform product.
- Improved wire payoff tension control.
- Counter furnished for measuring product in feet.
- Light windup for winding small conductors on small reels: also adapted for reels of 30" diameter and 13" overall width.

276-8 *Complete information available on request.*

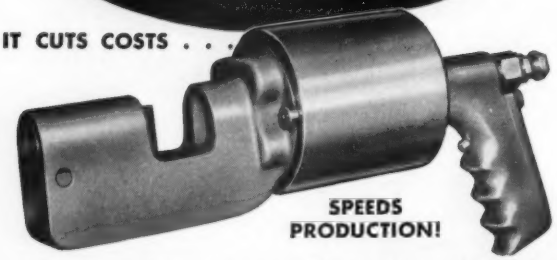
WARDWELL
BRAIDING MACHINE CO.
1212 HIGH STREET
CENTRAL FALLS
RHODE ISLAND, U. S. A.
Representatives for Europe, British Colonies and Dependencies
JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

HOW TROUBLE-FREE ARE YOUR ROD and BAR CUTTING OPERATIONS?

Check them with the —

HKP® PORTER ONE-HOSE *Hydraulic* ROD and BAR CUTTER

IT CUTS COSTS . . .



SPEEDS PRODUCTION!

If your rod and bar cutting costs are sky-high why not look at the PORTER HYDRAULIC ROD and BAR CUTTER. Steel mill men who size it up usually put it to work — because one or more combination of the 3 Cutterheads and 5 Power Units, turns out to be the team that speeds their output, slashes their costs. Here's why:

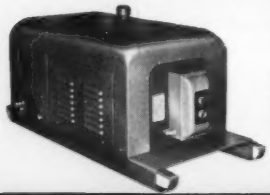
CUTTERHEAD PROTECTION — that eliminates constant "TIME OUT" and HIGH MAINTENANCE COSTS!

- **LONGER BLADES** with more bearing surface and rigid alignment eliminate side thrust and blade breakage.
- **FILTERED AIR** taken into the cylinder is forced out around the movable blade on each cut — eliminates the danger of dirt reaching bearing surface causing oil leakage and wear.
- **CONCENTRIC DESIGN** eliminates excessive wear of cylinder wall and ram.
- **LARGER CYLINDER AREA** allows the tool to cut capacity stock at a lower operating pressure, resulting in longer life for seal and hose.
- **SAFE, 12 VOLT CONTROL SWITCH** at the cutterhead gives instant finger-tip performance.
- **"KEY-POINT"** wear and replacement reduced to the minimum because of these exclusive HKP features.

A TRUE HYDRAULIC SYSTEM with these efficient, maintenance-saving features:

- **CONTROL VALVE** big and accurate enough for all industrial work. Solenoid operated.
- **EASY TO CHANGE RESERVOIR TYPE 10-MICRON OIL FILTER.**
- **PLUS** many other exclusive HKP features.

Ask to have a Porter Engineer tell you how the 3 CUTTERHEAD sizes and 5 HYDRAULIC POWER UNITS can provide the exact combination for your requirements.



OR — WRITE FOR COMPLETE PORTER HYDRAULIC ROD and BAR CUTTER FOLDER.

ATTENTION! Production and Quality Control Depts. Ask about our **NEW UPSET TESTING MACHINE!**

H. K. PORTER, INC. Somerville 43, Mass.

New German Mechanical Descaling Laboratory

In 1958 the Institute of Plastic Molding of Aachen Engineering College installed a mechanical descaling unit in the Hoesch-Westphalia mill in Dortmund to serve as a branch of the Institute for research on mechanical descaling. The Unit was placed in operation in the Spring of that year and is now being used to descale strip, rod and bar.

* * *

In order to vary the force with which the metal pellets strike the material to be descaled, the laboratory installed a variable speed drive on the fan blower that propels the fan at speeds between 600 and 2250 Cpm. This makes possible a blasting jet that can be adapted to the materials being descaled, using a fixed jet angle.

* * *

In addition to conducting studies on descaling, the laboratory is testing various types of pellets to determine their life and effectiveness. Independent of these investigations, the laboratory undertakes to find solutions to practical problems of operation that are brought to it by industry.

OIO Mill Moves to Alabama

The Johnston & Funk Metallurgical Corp., heretofore located in Wooster, Ohio has moved its headquarters to Huntsville, Alabama. The firm produces such metals as titanium, molybdenum, zirconium, tantalum and tungsten sheet, strip, rod and wire.

* * *

Much new equipment has been installed and output will be considerably increased. The added facilities will make possible an expanded line of special metal products.

* * *

The announcement made by Dr. Edward R. Frank, President, also stated that whereas The Company had been a wholly-owned subsidiary of The Mallory Sharon Metals Corp., under a new arrangement it now is owned jointly by Mallory-Sharon and P. R. Mallory Co.

Our Advertisers are Reliable Patronize Them

Outstanding Personalities of the Wire Industry

Riverside Alloy Sales Changes

The appointment of two inside salesmen has been announced by **F. H. Conant,** General Sales Manager of **Riverside-Alloy Metal Division,** H. K. Porter Company, Inc. He also announced that a complete realignment of inside personnel as of January 4, 1960.

* * *

Riverside-Alloy's new home office consultants are **Edward Kiefer,** formerly with North American Brass and Copper Co., a Philadelphia metal distributor and **John Allbright,** a retired Navy veteran. Both joined the Porter division within the past few months.

* * *

Other changes include the shifting of **Harvey Counts** from the area now handled by Kiefer to consultant for the Chicago and West Coast territories. Customers located in Cleveland, Detroit and the South will continue to contact **Roy Davis.**

Urbanik Moved To Bristol By Kaiser

J. S. Urbanik has been given new responsibities for managing the **Kaiser Aluminum & Chemical Corporation** wire and cable works at Bristol, R. I., according to **J. T. Dugall,** general manager of the company's electrical conductor division. He will continue to serve as division manager of plant operations.

* * *

The former Bristol works manager, **F. S. Bartlett,** has been appointed to the newly created executive position of division product projects manager.

* * *

Mr. Urbanik will move from the company's Newark, Ohio, works to Bristol. He has been with Kaiser Aluminum for ten years serving successively as Newark plant superintendent, general superintendent, works manager and division manager of plant operations.

* * *

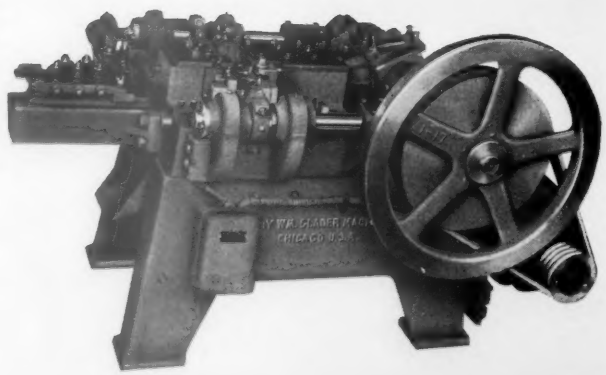
Mr. Bartlett's new position includes responsibilities for the development, manufacture and promotion of a broad range of specialized aluminum and copper electrical conductor products. He joined Kaiser Aluminum as works manager at Bristol in 1957 when the plant was purchased from the United States Rubber Company. Prior to that, he had been with U. S. Rubber at Bristol since 1926.

J. S. Urbanik F. S. Bartlett

GLADER NAIL MACHINE

a NAME and MACHINE
that have stood for
DEPENDABILITY since 1887

our Nail Machine
"KNOW-HOW"
means $$$ for you



Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

EXPORT DEPT. 122 EAST 42ND STREET • NEW YORK 17, N. Y.

Birkin Heads Heavy Machinery For Cleveland Crane

R. G. Birkin has been appointed Sales Manager of the Heavy Machinery Division, **The Cleveland Crane & Engineering Co.**, Wickliffe, Ohio, effective January 1, 1960. This includes Cleveland overhead traveling cranes, Steelweld press brakes, metal-cutting shears and presses.

* * *

Mr. Birkin has been with the company in various sales capacities for 33 years. In recent years he has been Eastern District Sales Manager of the Heavy Machinery Division.

* * *

He replaces C. H. Saiter who is retiring from active service, but will continue as a consultant for special projects.

Titan Metal Appoints Kurtz

The appointment of **Ronald E. Kurtz**, Detroit, Michigan, to the sales staff of the **Titan Metal Manufacturing Co.**, Division of Cerro de Pasco Corporation, has been announced here by **Ralph H. Lightner**, Titan vice president in charge of sales.

* * *

Mr. Kurtz will succeed **William F. Pioch** as district manager of Titan's Detroit sales office, on January 1, 1960, serving customer accounts in the entire state of Michigan. Mr. Pioch is resigning to enter business for himself following seven and one-half years service with Titan.

* * *

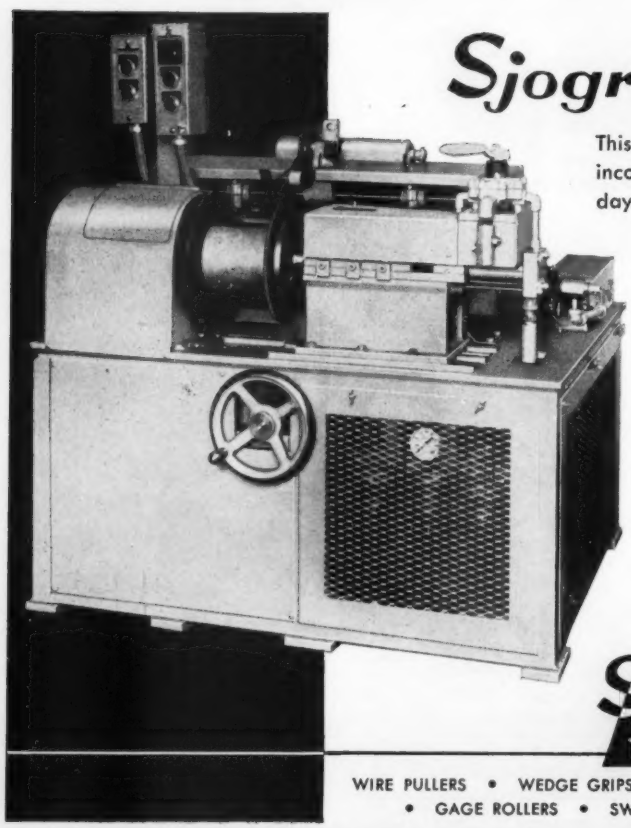
Titan is a leading manufacturer of brass and bronze rods, shapes, wire, welding rods and brass pressure die castings, as well as brass, bronze, copper, and aluminum forgings and machined parts. Founded in 1915, the firm has its main plants and offices at Bellefonte, Pa., and a western plant in Newark, Cal.

Elected To Board Of Spring Mfrs. Assn.

Frederick R. Downs, Jr., sales manager of **Stanley-Humason, Inc.**, of Forestville, Conn., a subsidiary of The Stanley Works, was elected to the Board of Directors for a three-year period at the annual meeting of **The Spring Manufacturers Association, Inc.**, held at the Barbizon-Plaza in New York City (Nov. 30 and Dec. 1). Also in attendance was **Larned S. Whitney, Jr.**, vice president and general manager of the subsidiary.

Harbeck Rejoins Fidelity

Fidelity Machine Company, Inc., Philadelphia, Pa., a leading machine manufacturer for the Textile, Wire and Rubber Industries, has announced that **Robert M. Harbeck**, who was with the organization from 1944 to 1955, has rejoined the company as Sales Manager of its Sinfra Wire Covering Machine Department. Mr. Harbeck developed technical data to improve the efficiency of textile covering of wire and he has been the author of several articles on that subject published in Wire and Wire Products.



Sjogren SPOOLER

This machine is especially designed for wire mill use and incorporates many outstanding features adapted to present day high speed production.

SPEED — When placed directly behind wire drawing machine the Sjogren Spooler is capable of spooling at 1800 fpm.

CAPACITY — 100 pound maximum.

TRAVERSE — Hydraulic traverse is infinitely adjustable from zero to 5/8" per rpm of spool.

LOADING — Loading of spool is air-actuated.

TENSION — Louis-Allis eddy current clutch type motor with potentiometer for variable tension.

STARTING — Forced acceleration circuit prevents slack wire during wire drawing machine acceleration.

BRAKING — Goodyear airplane disc type brakes.

USED BY WIRE MEN WHO WANT THE BEST!

Sjogren TOOL & MACHINE CO., INC.

14 Sword St.
AUBURN, MASS.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • GAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

Mr. Harbeck's engineering background and broad experience in the wire industry qualifies him to be of positive assistance to electrical wire manufacturers in solving wire covering problems. He will be permanently located at the main office of Fidelity in Philadelphia.

Reynolds Metals Appoints New Purchasing Head

Matthew W. Henry, vice president of **Reynolds Metals Company**, will retire on December 31 and will be succeeded as director of purchases by **Earl C. Silver**, according to an announcement made by **R. S. Reynolds, Jr.**, president. Mr. Silver has been assistant general purchasing agent at Reynolds since 1947.

Torrington Mfg. Promotes Two

Erman V. Cavagnero and **Werner Vogt** have just been promoted to new engineering positions in the Machine Division of **The Torrington Manufacturing Company**, Torrington, Conn., as part of the Division's expanding development of new and improved wire-forming equipment and machine attachments. As Chief Design Engineer, Mr. Cavagnero will supervise the design of mill machinery, spring coilers, torsion winders, four-slides and other Machine Division products. As Chief Development Engineer, Mr. Vogt will be in charge of advanced planning for wire and strip forming equipment, particularly the new Verti-Slide machines, as well as the application of existing products.

Armco Elects New Officers

The board of directors of **Armco Steel Corporation** has elected **Ralph L. Gray** chairman of the board and **Logan T. Johnston** has been chosen by the board to succeed Mr. Gray as president. Mr. Johnston had been executive vice president of the company. Both men assumed their new positions on January 1st.

* * *

Mr. Gray has been Armco's president since 1956, and has been a member of the board of directors since 1940. Mr. Johnston was elected executive vice president and a member of the Armco board in 1958.

Brown Made Chicago District Manager By AS&W

James E. Brown has been appointed Manager of Operations, Chicago District, by the **American Steel and Wire Division** of U. S. Steel Corp., to succeed **Nelson W. Dempsey**, who has retired.

* * *

Mr. Brown had been Vice President and General Manager of the Division's Cyclone Fence Department. In his new capacity, he will supervise all of the Division's operations in the Chicago area, which embraces the department for which he previously was responsible.

Bethlehem Steel's Rod And Wire Division Has New Sales Manager

Ralph E. Sharp, who has been Manager of Sales, Rod and Wire Products, since 1943 for **Bethle-**

DAVIS RE-SPARKER RE-SPOOLER UNIT

UNIT incorporates the new highly sensitive DAVIS Electronic Sparker with 18" Electrode. Maximum current: 10 ma. Has predetermined counter. Hand locater for pinpointing faults can be supplied. Fully automatic in operation.

THIS DAVIS ELECTRIC MODEL TRS RESPARKING-RESPOOLING-MEASURING UNIT will handle spools on the Payoff and Takeup shafts to 18" in diameter.

Has constant speed, variable width traverse up to 10" width, max.; payoff and takeup shafts are ¾", but adapters are supplied for other reel arbor hole sizes. Speed of Takeup controlled by ½ HP Ajusto-Spede motor. Payoff tension controlled electrically by Electric Brake submerged in oil. Braking can be pre-set.

This compact unit was designed primarily for use on Teflon insulated cables but is adaptable to wires insulated with any thermoplastic material. Entire unit mounted on 24" x 87" angle iron bench.

DAVIS WIRE & CABLE EQUIPMENT

DAVIS ELECTRIC CO.

WALLINGFORD, CONNECTICUT

DUAL and SINGLE TAKE-UPS • PAY-OFFS • CAPSTANS
SPARK TESTERS • RE-SPOOLERS
RAM-TYPE TEFLON EXTRUDERS

hem Steel Company, retired on February 1, 1960. He has been succeeded by **E. A. Mercner**, who had been Assistant Manager of Sales.

* * *

Mr. Sharp, a graduate of Pennsylvania State College with an industrial engineering degree, joined the company's rod and wire sales division in 1929.

* * *

Mr. Mercner joined Bethlehem Steel in 1915, and has served in various sales capacities. He was made Assistant Sales Manager in 1957.

GE Appoints New England Rep. On Silicones

George E. Shepherd has been appointed Manager in charge of a newly established sales district for **General Electric's Silicone Products Department.** Designated as the New England District, this area has responsibility for the sale of G.E.'s silicone products in Massachusetts, Rhode Island, Maine, New Hampshire, Vermont, Connecticut, and Upstate New York. District Headquarters will be located at 145 North Beacon St., Boston 35, Mass.

* * *

A graduate of Gettysburg College with a Bachelor of Science degree in chemistry, Mr. Shepherd received his Master's Degree in organic chemistry from Pennsylvania State College in 1949. He joined General Electric's Silicone Products Department in 1950 as a member of the Engineering section and held various assignments in product development and application engineering. He joined the Department's Field Sales organization in 1953.

Somerside Retires From Camden

After twenty years with the **Camden Wire Company**, Camden, N. Y., and a lifetime in the wire business, **C. A. Somerside** has retired from the company's sales department. He will continue, however, to serve Camden Wire in an advisory capacity.

Fred S. Van Valkenburg

Fred Stevens Van Valkenburg, who retired recently as Chairman of the Board of the **Waterbury Farrell Foundry and Machine Company**, Waterbury, Connecticut passed away on January 2, 1960, following a long illness, at the age of seventy-two.

* * *

Mr. Van Valkenburg was born in Minneapolis and received his early education in Athol, Massachusetts. He entered the General Electric Company's apprentice course at the Massachusetts Institute of Technology in 1905, graduating from the Institute in 1908. He joined the Waterbury Machine Company, predecessor of the present company, as a draftsman in 1910. Advancing through various positions, he became Vice President and finally Chairman of the Board, from which post he retired in May, 1958.

* * *

Because of his many years of responsibility for the design, pro-

• 296 Papers.
• 6 20 Paper Heads, 16" Pad.
• 11 16 Paper Heads, 20" Pad.
• Q.B. Type Caterpillar Haul-off, Maillefer Patent.
• Lay Adjusted by P.I.V. Driving Each Head and P.I.V. on Caterpillar.
• Total Length of Equipment for 296 Papers, Including Caterpillar, but Exclusive of Let-off and Take-up: 118'.
HI-VOLTAGE PAPER TAPING MACHINE FOR 300 K.V. CABLES
WRITE FOR DETAILED INFORMATION
POURTIER Machines
76 a 82, Rue de la Fraternite
ROMAINVILLE (Seine)
FRANCE

duction and sale of the wire processing equipment for which his company is noted, he was well and widely known throughout the wire industry. "Van" had been a member of The Wire Association since 1943 and a regular attendant at the conventions and regional meetings.

Robert B. Whyte

It is with profound sorrow that we record the passing of **Robert B. Whyte,** 73, a Director of the **Macwhyte Wire Rope Company,** Kenosha, Wisconsin, on November 27, 1959. He was well known throughout the steel industry.

* * *

Born in Chicago, Illinois, educated in the public schools of Waukegan, he attended Denison University and received a degree in Mechanical Engineering from Cornell University in 1913.

* * *

Mr. Whyte joined the Macwhyte Company on October 1, 1917, after four years' service with the American Steel and Wire Company at Waukegan and Worcester, where he learned the machinist trade and progressed through engineering and supervisory work.

* * *

He advanced through the Macwhyte mill to become General Superintendent. In 1937 he was elected Vice President and Director of Macwhyte Company, retiring from active service on December 31, 1953, to enter management consultant work. He continued as a Director until the time of his death.

Robert B. Whyte

Harold M. Shonberg

Harold M. Shonberg, president of **Alpha Metals, Inc.,** Jersey City, N. J., and the **Alpha-loy Corp.,** Chicago, Ill., was one of five people killed Saturday, December 5, at Palm Desert, California, when the small plane in which he was being given a demonstration flight so that he might consider purchasing it for his company, collided in the air with another private plane. He was 49.

* * *

Mr. Shonberg started his firm in 1930. He had previously taken over I. Shonberg, Inc., a company founded by his grandfather in 1871 as a metal refinery then reorganized by his father, in 1912, as Standard Rolling Mills, Inc.

* * *

Mr. Shonberg was a mechanical engineer, graduating from Brooklyn Polytechnic Institute in 1930. In 1956, he was honored as "an

The Difference
IS HERE.....
NEW MPS CONVOLUTE DURA CURL RIMS...
The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous No-Crev feature.
Ask about MPS CONVOLUTE DURA CURL RIMS today. We invite your inquiries.
MPS
CONVOLUTE
Dura Curl
Spools & Reels
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
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Telephone Attleboro 1-0848
Mossberg PRESSED STEEL Corporation
Division of Wanskuck Co.

outstanding graduate" with the Institute's Certificate of Distinction for his contribution to "Science and Engineering for Human Well-Being."

New Oven Catalog

Despatch Oven Co. 619 E. 8th St., Minneapolis 14, Minn., has issued a new catalog in which information of their full line of ovens for the electrical, industrial and institutional industries, and for laboratories, pilot plants, and so forth is set forth.

* * *

Ready reference tabs assist buyers to locate applications in which they are interested. Complete technical data on each oven is provided and a list of Despatch representatives throughout the country is included for convenience in seeking added information.

* * *

Copies may be secured by writing on Company letterhead to the Despatch Oven Company.

Names Canadian Representative

Upton Bradeen & James Ltd., Toronto, Ont., has been named exclusive Canadian sales representatives for **National Electric Welding Machines Co.,** Bay City, Mich.

* * *

In making the announcement, **Simon Fisher,** National general manager, said appointment of the Canadian firm is effective immediately. Their principal office is at 890 Yonge Street, Toronto, Ont. Branch offices are located at Montreal, Ottowa, Hamilton, Windsor, Winnipeg and Vancouver.

Wheelabrator Acquires Lord Chemical

Wheelabrator Corporation, Mishawaka, Ind., manufacturer of blast cleaning equipment, steel abrasives, and dust and fume control equipment, has acquired approximately 80% of the controlling stock of **Lord Chemical Corporation,** York, Pa., according to **James F. Connaughton,** President of the Indiana firm.

* * *

Lord Chemical will continue to operate in York, manufacturing its line of vibratory and barrel type finishing equipment, including compounds and media for cleaning, deburring, and precision finishing of metal parts. Organized in 1951, the company has achieved prominence in pioneering the revolutionary vibratory precision finishing process.

* * *

Wheelabrator entered the finishing field in July, 1958, when it organized its Techline Division, Vicksburg, Mich., specialists in wet blasting and barrel finishing. It is claimed that the combination of the Techline and Lord Chemical lines provides the most complete range of wet and dry precision finishing equipment available.

New Thermal Wire Stripper

The new Model G Thermal Wire Stripper features a continuously variable heat control for precise temperature adjustment required in stripping virtually any size or type of plastic-insulated wire. This unit, designed for production-line operation, can be used either as a bench-operated tool or held in the hand for use in inac-

EXECUTIVE REPORT #7

STRAIGHT-LINE DESCALING AUTOMATES WIRE AND BAR DRAWING LINES

Wheelabrator abrasive blast descaling brings new automation to wire products manufacture, with substantial savings in time and labor. Whereas batch pickling requires multiple handling operations, this mechanical descaling process involves handling coils only once or twice.

Rod can be straightened, cleaned, coated, drawn and cold headed in one continuous, straight-line operation. Single or multiple strands can be cleaned at speeds up to 600 fpm. The savings through eliminating acid pickling and multiple handling are enormous.

Take advantage of WHEELABRATOR'S engineering experience in wire descaling

Wheelabrator's unequalled experience in blast descaling of wire is at your service. Send for Bulletin 148-D illustrating the Wheelabrator automated wire drawing method. Wheelabrator Corp., 389 S. Byrkit St., Mishawaka, Ind. Canadian Division: P. O. Box 490, Scarborough, Ont.

cessible locations. The stripper uses two parallel heating elements to quickly sever plastic insulation and provides a pincers action to remove it with a slight pull. Since no sharp cutting edges are used, there is complete freedom from cut or nicked wires.

* * *

The Stripper strips any size down to the finest stranded wire without adjustment. It is also suited for use on coaxial cable. It will strip Teflon as well as lower-melting materials such as vinyl, nylon, mylar, dacron, rayon, polyethylene, etc.

* * *

For further information, write **Western Electronic Products Co.**, 655 Colman St., Altadena, Cal.

Mechanical Wire Descaler

Straus-Artys Corp. of 45 No. Station Plaza, Great Neck, N. Y., announces the new Salvi Mechanical Wire Descaler for the processing of wire rod of low carbon, high carbon, alloy or stainless steel.

* * *

Salvi Descalers not only break and remove the scale, but also brush the rod clean and then apply forced lubrication and at the same time begin the wire drawing operation.

* * *

The rod is introduced into the descaler, which completely removes the oxide and prepares the rod surface for wire drawing. Since with mechanical descaling no acids are used, there is no acid waste disposal problem.

* * *

Salvi Mechanical Descalers come in several size models to suit particular needs.

Variable-Speed Sheave Bulletin

Wood's bulletin No. 6102 pictures and describes new stationary control "SVS" variable - speed sheave for standard V-belts. The patented, positive-locking "SVS" sheave is available with two, three or four grooves. Bulletin covers its non-freezing construction, method of installation, easy speed change and other features. An "exploded" view shows and labels the various components. Tables are given to aid in the proper selection of "SVS" variable-speed sheaves and companion sheaves. "Sure-Grip" companion sheaves and "Quick-Slide" motor bases are also covered in this eight-page, two-color, letterhead-size bulletin. **T. B. Wood's Sons Co.**, Chambersburg, Pa.

Meeting On Computers In Production

The Institution of Mechanical Engineers has arranged an informal discussion on 'The Computer in Production'. The purpose of the meeting is twofold:

1. **To introduce Chartered Mechanical Engineers and Managers to the latest techniques involving the application of computers in production.**
2. **To provide a forum for managers, engineers and users to present their views to manufacturers of computers.**

* * *

The meeting will be held on March 21 and 22, 1960. Several distinguished engineers and users of computers will give talks on the subject, and the discussion will be informal, and will not be reported.

* * *

Visits to Computer Centres and to installations where computers are being used on production prob-

EXECUTIVE REPORT #8

ROD DESCALING, COATING AND DRAWING IN ONE CONTINUOUS OPERATION

at Lamson & Sessions Co.

In their new and ultra-modern Cleveland plant, Lamson & Sessions Co. has proved that Wheelabrator straight-line blast descaling is the shortest distance between hot rolled rod and wire profits.

Their automated descaling line starts with hot rolled rod on a payoff reel (A), provides a portable welding station (B) for joining successive coils, passes through a snarl switch (C) and straightener-leveler (D), through the Wheelabrator blast descaling cabinet (E), through coating and drying equipment (F) and to the draw block and re-coil unit (G) — all in a straight line, with no interruption and no intermediate handling.

This efficient method is made possible by the speed and thoroughness of Wheelabrator airless blast descaling, which removes all scale or rust down to virgin metal, without acid pickling, at speeds as dictated by subsequent operations.

WHEELABRATOR method lets you automate your wire and bar drawing lines

With the Wheelabrator method, you can blast clean in line with patenting, cold drawing and cold heading. To see how many leading producers are saving with this system, write for Bulletin 148-D. Wheelabrator Corp., 389 S. Byrkit St., Mishawaka, Ind. Canadian Division: P. O. Box 490, Scarborough, Ont.

Coming in May - A Regional Meeting of the

ELECTRIC WIRE & CABLE SECTION of THE WIRE ASSOCIATION

May 4-5, 1960, Sheraton Hotel, Philadelphia, Pennsylvania

This Regional meeting, patterned on the highly successful meeting held in Boston in April, 1959, will have some excellent papers on various phases of electric wire and cable processing, a Hospitality Hour, and a plant inspection tour of Walker Brothers' plant in Conshohocken, Pa., just outside of Philadelphia.

Full details will be announced at a later date, when the plans have been finished — and these are now well along.

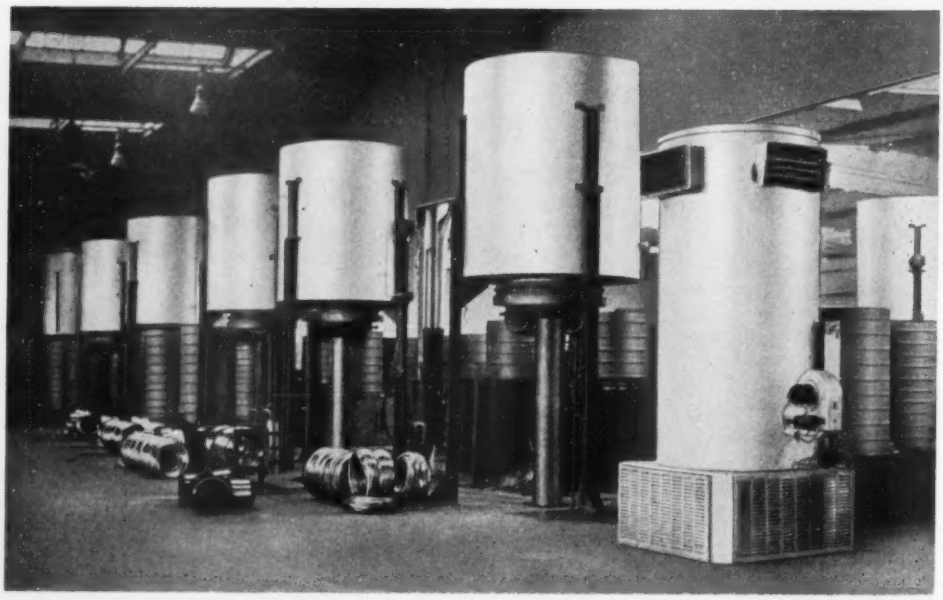
Reserve these dates now and plan to be with us. All interested in insulated wire are invited.

THE WIRE ASSOCIATION

Richard E. Brown, Executive Secretary

453 Main Street • **Stamford, Conn.**

THE LAST WORD IN MODERN EFFICIENT DESIGN!



SEVERAL VACUUM BRIGHT ANNEALING UNITS WHICH WE HAVE INSTALLED IN ONE OF THE MOST PROMINENT CABLE WORKS IN GERMANY

(German and Foreign Patents)

*

SOLE REPRESENTATIVE:
PAUL REICHER
Machinery & Equipment
600 Eglington Ave., East,
Toronto 12, Ont., Canada

OFENBAU FRITZ G.m.b.H.&Co.K.G. HAGEN, (W.-GERMANY)

lems will be arranged.

* * *

This meeting is open to members and visitors, and is aimed primarily at management level; but the subject treatment is also likely to be of interest to specialists in computers.

* * *

Those who wish to attend the meeting should apply to The Secretary, The Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London S.W. 1.

New Bulletin On Plastic Processing Equipment

A new bulletin illustrating and describing its complete line of plastic extruders, casting roll units, take up equipment, and accessories has been published by **Modern Plastic Machinery Corporation,** 64 Lakeview Ave., Clifton, N. J., and is available upon request. Product specifications and features are shown for extruders ranging from 1″ laboratory models up to 6″ screw diameter production extruders. Other items include combination overhead pinch roll and take up units for blown tubular film, the MPM sheeting line, and packaged monofilament equipment. This bulletin provides a ready reference to a portion of the MPM product line and lists the company's domestic and foreign sales representatives.

* * *

In its recent move to Clifton, the Company has tripled its facilities, added new production equipment, and centralized all engineering and sales activities in one place.

Welding Electrode Firm Expanding West Coast Facilities

All-State Welding Alloys Company, manufacturers of aluminum welding electrodes, is expanding its Los Angeles facilities to better serve growing markets in the West.

* * *

The Company has moved into modern facilities at 4954 Firestone Boulevard, more than doubling the space previously available for its Pacific operations. The Los Angeles operation includes the most modern welding-wire spooling machines of their type. These automatic machines have been specially designed for maximum tension control and level layer applications during spooling operations.

* * *

All-State Welding Alloys' home office and plant is in White Plains, N. Y., and its Aluminum Wire Products affiliate is centered in Glastonbury, Conn.

* * *

Officers of the concern include **T. D. Nast,** president, and **R. H. Mandel,** vice-president, and Western Division Sales Manager, **Harry G. Peacor.**

TO SELL—ADVERTISE IN WIRE AND WIRE PRODUCTS

It pays—send for rates

453 Main St., Stamford, Conn.

THE *New* FEDERAL 5000 VOLT ELECTRONIC SPARK TESTERS

FOR ALL TYPES OF ELECTRIC WIRE AND CABLE. THE SPEED IS DETERMINED BY THE ELECTRODE LENGTH.

FEATURES

- **Controlled ma output.**
- **Hi-Speed Fault Detector.**
- **High Sensitivity.**

The Model CV is for use with Extruding Machines and Model RS for Respooling operations. Stand optional. Electrode length supplied as ordered.

FEDERAL 5000 VOLT MODEL C. V. other models: 10, 15, 30 & 50 K. V.

THE FEDERAL MANUFACTURING CO. WALLINGFORD, CONN.

WIRE MACHINERY • TESTING EQUIPMENT

The New, Revised 1960 Edition Of The
WIRE AND WIRE PRODUCTS BUYERS' GUIDE
And Year Book of The Wire Association
will be ready for you on May 1, 1960.

The thousands of new headings, new products, addresses and other important information changes in the listings of sources of bars, rods, wire, wire products, electric wire and cable and of sources for machinery, equipment and supplies used in the Wire Industry, make this directory an essential reference book for every wire man. You need and should have it.

The YEAR BOOK SECTION is completely new. It contains information to keep you posted on the affairs of THE WIRE ASSOCIATION, such as:

OFFICERS AND DIRECTORS FOR 1960.
LISTS OF ASSOCIATION MEMBERS BY INDIVIDUALS AND COMPANIES.
LIST OF MEDAL AWARD WINNERS AND HONORABLE MENTION AWARDS.
CONSTITUTION AND BY-LAWS OF THE ASSOCIATION.
HISTORY OF ASSOCIATION ACTIVITIES, DURING 1959.
INDEX TO ARTICLES AND SUBJECTS IN WIRE AND WIRE PRODUCTS PUBLISHED IN 1959.
INDEX OF AUTHORS FOR THE YEAR OF 1959.

THE PRICE: $5.00 PER COPY

Subscribers to WIRE AND WIRE PRODUCTS receive a discount of 40%. Association members receive a copy without additional cost, but may order extra copies at $3.00 each.

Keep yourself up-to-date. Send your order today to

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453 MAIN STREET STAMFORD, CONN.

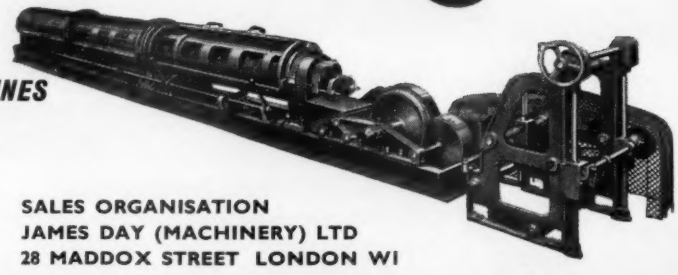
world wide sales...

U.S.A. NORWAY SWEDEN AUSTRALIA SCOTLAND FRANCE NORTHERN IRELAND RHODESIA INDIA ENGLAND AUSTRIA CANADA SOUTH AFRICA MALAYA WALES EIRE BELGIUM ITALY CZECHO SLOVAKIA

. . . indicate a world-wide reputation. Hanson & Edwards have supplied High Speed Tubular Stranding Machines to many of the most important Wire Rope and Cable factories throughout the world. These machines have rotors which run in large SPLIT ROLLER BEARINGS, not on support rollers, giving higher speeds, smoother running and lower maintenance costs

ROLLER BEARING TYPE
HIGH SPEED TUBULAR
STRANDING MACHINES

Made in various sizes for reels from 5"x 2½" up to 24"x 12" Write now for details



HANSON & EDWARDS LTD
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28 MADDOX STREET LONDON W1

U.S. AGENTS:—THE EDMANDS COMPANY 860 WELLINGTON AVENUE CRANSTON 10, R.I.

P2035

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,914,778, BED SPRING, patented December 1, 1959 by Mathew Intner, New York, N. Y.

This frame employs a flexible grid of non-extensible elongated wires arranged in rows extending longitudinally and laterally within an upper frame portion and being pivotally interconnected at the intersections of the rows, and wire compression springs underlying and supporting only the longitudinal central portion of the grid and enhancing the resistance to flexing of the central portion under load, while rigid support members laterally brace the sides of the upper frame portion against the inwardly-directed lateral forces exerted thereagainst by the grid.

* * *

No. 2,914,897, MACHINE FOR THE PRODUCTION OF PACKED COILS OF WIRE AND THE LIKE, patented December 1, 1959 by Otto Haugwitz, La Celle Saint Cloud, France, assignor to Societe Anonyme Geoffroy-Delore, Paris, France, a French company.

Included in the machine construction is apparatus for feeding a packing sheet of crepe paper about the coil of wire in timed relation with the other apparatus of the coiler.

* * *

No. 2,915,103, WIRE CUTTING AND BENDING MACHINE, patented December 1, 1959 by Kenneth E. Frerichs, Burlington, Iowa, assignor, by mesne assignments, to Sylvania Electric Products, Inc., Wilmington, Del., a corporation of Delaware.

The machine, after cutting the wire into predetermined lengths, folds the cut lengths midway their ends into Vs.

* * *

No. 2,915,104, MACHINE FOR MAKING BARBED METAL BAND, patented December 1, 1959 by George E. Rasmussen, Park Forest, Ill., assignor to Acme Steel Company, Chicago, Ill., a corporation of Illinois.

A machine for use in forming a barbed metal band from a flat metal strip having its edges slitted diagonally to form attached pointed portions is disclosed and claimed in nine claims.

* * *

No. 2,915,171, WIRE FEEDING MEANS, patented December 1, 1959 by Cecil C. Peck, Euclid, Ohio, assignor to Cecil C. Peck Company, Cleveland, Ohio, a corporation of Ohio.

More specifically, the means is adapted to advance a continuous length of wire or weld rod to an arc-welding head.

No. 2,915,616 WIRE BENDER AND CONNECTOR, patented December 1, 1959 by John T. Griffin, Waltham, Mass., assignor to Clevite Corporation, Cleveland, Ohio, a corporation of Ohio.

Disclosed is a machine for shaping and applying a loop of ribbon to the end of a length of wire.

* * *

No. 2,915,820, PORTABLE MACHINE FOR SHEARING STEEL RODS, WIRE ROBES AND THE LIKE, patented December 8, 1959 by Kazunosuke Natio, Toyko, Japan.

This is a manually-operated machine, employing two pairs of disk-shaped cutters, having U-shaped cutting grooves, for cutting the wire.

* * *

No. 2,915,822, PORTABLE MACHINE FOR SHEARING STEEL RODS, WIRE ROPES AND THE LIKE, patented December 8, 1959 by Kazunosuke Naito, Tokyo, Japan.

This patent covers a modification of the machine of patent 2,915,820.

* * *

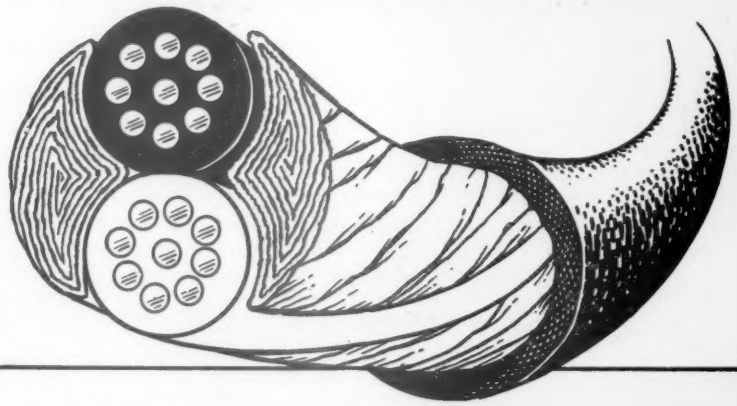
No. 2,915,928, APPARATUS FOR STRIPPING WIRES AND CABLES, patented December 8, 1959 by Gordon P. Felts, Sierra Madre, Jerome W. Parks, Balboa Island, and Robert W. Seeger, Pasadena, Calif., assignors to Microdot Inc., South Pasadena, Calif., a corporation of California.

There are fifteen claims to this patent, where centrifugal force is utilized to move the cutting element to operative positions, with adjustment of the cutting depth of the cutting elements.

* * *

No. 2,916,087, CUSHION SPRING ASSEMBLIES AND SPRING ELEMENTS THEREOF, patented December 8, 1959 by Martin W. Laitur, Detroit, Mich., assignor to L. A. Young

INSIDE STORY ON
FLEXIBLE CORDS



If you are not realizing a desired profit in your manufacture of flexible cords, why not consider Plymouth S.J. (Sisal) Filler for these reasons:

STRENGTH: Provides ample tensile strength to meet U.L. tests for 18-16-14 gauge, S, SJ, SV, SJT, SVT cords. Comes in 4 sizes.

FLEXIBILITY: S.J. Cable Filler will not stiffen cord in *any* way.

GREATER FILL CAPACITY: Plymouth's special S-Z twist (opposing twists) makes finished cord uniformly round, with no ridges, bumps or convolutions.

CLEAN STRIPPING: S. J. Cable Filler allows cleaner, faster cutting of finished product in Cord Set department . . . no ragged filler ends.

ECONOMY: The end result of all these advantages. Plymouth S.J. Cable Filler has been proven by several of the largest flexible cord manufacturers to be the most economical filler ever used.

Call or write any office below. We will be glad to consult with you on your cable filler problems.

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CApital 7-1134

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P.O. Box 10215
New Orleans, La.
VErnon 5-7243

70 Sacramento St.
San Francisco, Calif.
GArfield 1-4709

750 Bay St.
Toronto, Ont., Canada
EMpire 3-4281

PLYMKRAFT DIVISION
Plymouth Cordage Company, Plymouth, Massachusetts

WIRE ASSOCIATION MEETINGS IN 1960

MAY 4-5 — ELECTRIC WIRE & CABLE SECTION REGIONAL MEETING at the
Sheraton Hotel, Philadelphia, Pa.

Program Chairman: JAMES S. HIGGINS, Plant Eng., Copper Div., Walker Bros., Conshohocken, Pa.

*** JUNE 9-10 — PACIFIC COAST REGIONAL MEETING at the**
Statler-Hilton Hotel, Los Angeles, Calif.

Program Chairman: EARL R. POTTER, Pres. & Gen. Mgr., Industrial Wire Products Corp., Los Angeles, Calif.

NOVEMBER 14-17 — THE ANNUAL CONVENTION at the
La Salle Hotel, Chicago, Ill.

General Program Chairman: G. G. STENDAHL, Dept. Chief, Mfg. & Devel. Eng., Western Electric Co., Chicago, Ill.

Ferrous Program Chairman: CLYDE E. CRANE, Met., Wire Div., Republic Steel Corp., Chicago, Ill.

Non-Ferrous Program Chairman: HENRY McCONNELL, Pres., Torpedo Wire & Strip, Inc., Torpedo, Pa.

Electric Wire & Cable Program Chairman: MARSHALL V. YOKELSON, Chief Metallurgist, General Cable Corp., Bayonne, N. J.

*** The Semi-Annual Meeting of The Board of Directors will be held in Los Angeles at this time.**

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

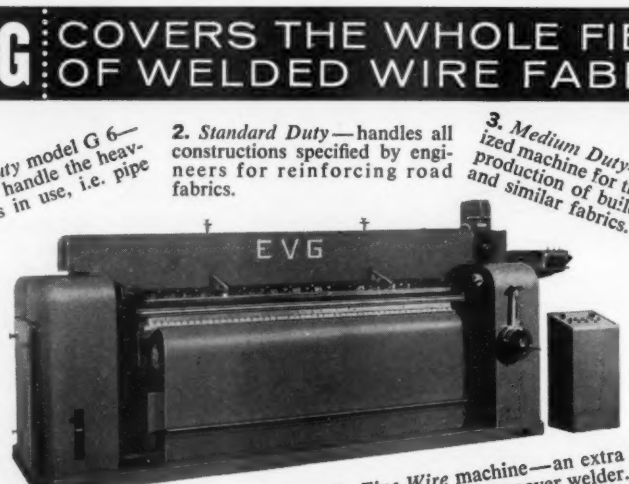
453 MAIN STREET **STAMFORD, CONN.**

EVG COVERS THE WHOLE FIELD OF WELDED WIRE FABRIC

1. *Heavy Duty* model G 6— designed to handle the heaviest meshes in use, i.e. pipe mesh.

2. *Standard Duty*—handles all constructions specified by engineers for reinforcing road fabrics.

3. *Medium Duty*—a specialized machine for the low-cost production of building mesh and similar fabrics.



4. *Light Wire* machine—a high precision welder, specifically designed for the production of visual type fabrics; fencing, mink batteries, etc.

5. *Fine Wire* machine—an extra high speed, flexible changeover welder. Particularly suited to the production of welded hardware cloth in all gauges and spacings.

COMPLETE LINE OF FULLY AUTOMATIC WELDING EQUIPMENT

Please direct inquiries to: **Richard E. Kleinhans** U.S.-Canadian Representative 122 East 42nd St., New York 17, N.Y. OXford 7-0770

Spring & Wire Corporation, Detroit, Mich.

A cushion spring element is disclosed, formed of a continuous strand of wire uniformly bent back and forth in sinuous form from end to end thereof and comprising an intermediate upwardly bowed load supporting portion, a downwardly projecting V-shaped supporting arm at one end of the load supporting portion, and an inturned strut portion at the other end of the load supporting portion disposed under the load supporting portion.

* * *

No. 2,916,152, SHIPPING RACK FOR WIRE COILS, patented December 8, 1959 by William Lee Dull, Houston, Tex., assignor to Armco Steel Corporation, a corporation of Ohio.

Mounted upon a polygonal base member is a wire coils-receiving upwardly extending rigid frame of heavy wire or rods.

* * *

No. 2,916,220, COIL WINDING MACHINE, patented December 8, 1959 by Robert L. Huffman, Palatine, Ill., assignor to General Telephone Laboratories, Incorporated, a corporation of Delaware.

The machine is of the toroidal coil-winding type having a wire-carrying shuttle ring disposed to interlink and revolve through a toroidal core to wind a loop of wire around the core.

* * *

No. 2,916,222, METHOD OF WINDING ARMATURE CORES AND APPARATUS, patented December 8, 1959 by Cecil Farmer, Pawtucket, R. I.

There are eleven claims to this patent for wire-winding a slotted armature coil.

* * *

No. 2,916,225, DEMOUNTABLE-HEAD REEL FOR ANNULAR BUNDLES OR PACKAGES OF COILED WIRE, patented December 8, 1959 by Basil H. Swallow, Worcester, and Henry A. E. Sjoberg, North Grafton, Mass., assignors to Johnson Steel & Wire Company, Inc., Worcester, Mass., a corporation of Massachusetts.

Included in the construction of this reel is a draw bar for association with a pair of flanged and spaced heads and a preloaded spring so that the full force of the spring is exerted through the draw bar to urge one head inwardly, thereby to strongly compress the spoolless annulus of coiled wire mounted between the two heads.

* * *

No. 2,916,226, WINDING ARBOR, patented December 8, 1959 by George P. McGraw, Jr., Downers Grove, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This arbor is provided with a number of ribs composed of polytrifluorochloroethylene or polytetrafluoroethylene disposed about a body member with portions of the ribs extending laterally beyond the body member.

* * *

No. 2,916,229, APPARATUS FOR SUPPORTING AND TRANSFERRING REELS OF WIRE FOR CONTINUOUS UNREELING OF THE WIRE, patented December 8, 1959 by Benson F. Bachus, Westchester, and Thomas C. Fitzgerald, Chicago, Ill., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Empty reels may be lowered from elevated positions to lower positions in order to readily remove them.

* * *

No. 2,917,253, HANDLE FOR REELS OF WIRE, patented December 15, 1959 by Roy C. Way, Tennessee, Ill.

For manipulating a reel of wire on a horizontal axis, the handle includes a pair of pivotally interconnected handle and reel engaging portions which may be manipulated to extend these portions into or out of the axial center of the reel.

* * *

No. 2,917,756, METHOD AND APPARATUS FOR PROGRESSIVELY COMPRESSING THE END PORTION OF A WIRE TO FORM A NAIL, patented December 22, 1959 by Gerald S. Stearns, Charleston, W. Va. and Gordon E. Smart, Cleveland, Ohio.

The machine is adapted for making headed wire nails from proper diametrically size cut-to-length wires.

* * *

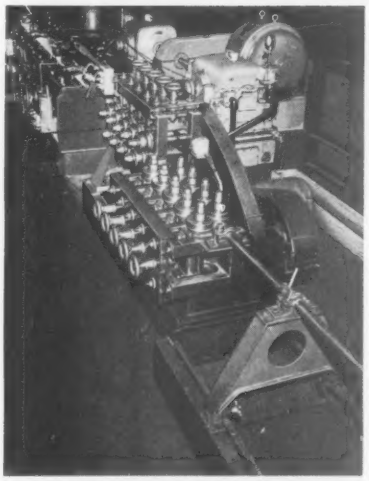
No. 2,918,094, FOURDRINIER WIRE BELT, WIRE, AND ALLOY COMPOSITION THEREOF, patented December 22, 1959 by Henry S. Freynik, Burlington, N. J., assignor, by mesne assignments, to H. K. Porter Company, (Delaware), a corporation of Delaware.

A woven wire belt particularly adaptable for use in Fourdrinier machines

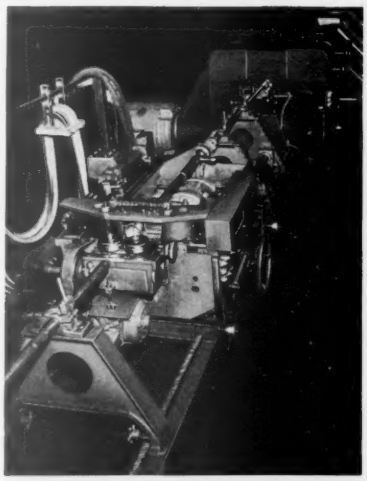
(*Please turn to page* 259)

LOMATIC

COMBINED DRAWING STRAIGHTENING CUTOFF AND POLISHING MACHINE



Payoff - Drawbench - Straightener



Flying Shear - Polisher - Discharge

Now available in two standard sizes, the revolutionary LOMATIC machines handle ferrous and non-ferrous rods and tubes at speeds up to 200 ft. per min. and with drawing capacities up to 16,000 lb. Compared to conventional separate rod drawing, straightening, polishing and cutting-to-length operations, the LOMA single-operation fully automatic machine offers the following major advantages:

- **Greater output rate — continuous operation at high speed**
- **Reduced labor cost — only one operator required**
- **Improved straightness — stock is straightened in two planes**
- **Perfect concentricity — obtained by straight-line drawing action**
- **Higher surface finish — due to two-stage polishing unit**

The complete line comprises an uncoiler, a pre-straightener, a drawbench, a roller straightener, a flying cutoff, a polishing machine and a discharge table. All components required for the complete sequence of processing operations are interlocked mechanically and electrically into one integrated and synchronized line which is controlled by only one operator.

Our standard line of equipment includes:

- **Casting Machines and Molds**
- **Saws and Cut-off Machinery**
- **Hot and Cold Rolling Mills**
- **Rod and Tube Draw Benches**
- **Roller and Stretcher Levellers**
- **Air and Hydraulic Tube Testers**

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

New Retractable Cables Announced

Spectra-Strip Wire & Cable Corporation announces a new group of retractible cables called Spectra-Flex. These should go a long way toward solving moveable hook up problems. Spectra-Flex cables are based on the Spectra-Strip method of bonding flat multi-conductor, multi-colored cables. Conductors can vary from a few to hundreds.

* * *

To acquaint Engineers with the possibilities of this new line of wiring specialties, the firm is offering a selection of their various products in the form of a low cost kit. For details, write John Ford, Sales Manager, Box 415, Garden Grove, Calif.

New Firm Producing Color Dispersion

Polymer Dispersions, Inc., a new Ohio Corporation, announces the installation of production facilities to produce polymer color concentrates and dispersions. The sales will be handled by **Harwick Standard Chemical Co.** under the Harwick Stan-Tone registered trade name. Polymer Dispersions, Inc. is located at Fairport Harbor, Ohio. Banbury and other necessary equipment is available to produce, pelletize and package polyethylene color concentrates and cutbacks (under the Stan-Tone PE designation) as well as other dispersions to customer needs in the blow molding, filament, film, pipe and wire and cable industries.

* * *

Harwick Standard Chemical Co. will continue customer service and color matching work at their Akron Color Laboratory. Research and development on polymer concentrates will be handled at the Polymer Dispersions, Inc. laboratory facilities.

New Power Convection Bulletin

Heat treating furnaces in which the principle of "Power Convection" is used, are described in a new 8-page folder.

* * *

Applications of Power Convection systems which are achieving unprecedented rates of heat transfer are shown photographically, and also schematic flow diagrams of typical Power Convection systems are reproduced.

* * *

Request your copy of Bulletin SC-182 by writing to Surface Combustion Division, Toledo 1, Ohio.

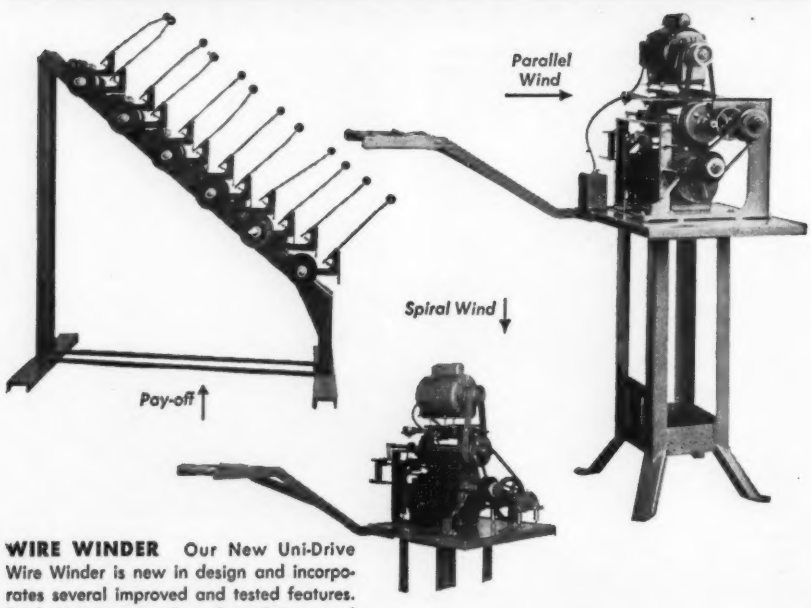
Bulletin On Advantages Of Silicone Rubber

"Why and Where It Pays You To Use Cable Insulated With General Electric Silicone Rubber", is the subject of a new, illustrated bulletin now available from the Silicone Products Department, General Electric Company, Waterford, New York.

* * *

Identified as CDS-208, this publication lists the outstanding insulated properties of G-E Class 900 electrical grade silicone rubber and discusses the major application areas in which silicone insulated cable has proven its performance. The added savings in installation costs are illustrated by a cost comparison between silicone insulated cable and varnished cambric cable. In addition, a com-

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

parison of properties vital to cable applications is presented between silicone rubber, butyl, GR-S, and natural rubber.

New Chip Separator

The Ransohoff Chip Separator was specially designed to separate chips from screw machine parts. Hand riddling is eliminated. The separator processes approximately 1,000 lbs. of parts per hour.

* * *

The work and chips are fed into a hopper where they are vibrated over a sloping screen through which a high velocity air blast is directed. Chips are blown upwards as they pass over the screen, passing through a directing hood into containers or onto a conveyor. The work is discharged from a chute at the side. The machine is compact and requires only 40¾"x92" of floor space.

* * *

For additional information, write **Ransohoff, Inc.**, N. 5th St. and Ford Blvd., Hamilton, Ohio.

Introduces New Spring Nut

The Jacobson Nut Mfg. Corp., Kenilworth, N. J., announces that it is currently manufacturing a new line of Spring-Nuts.

* * *

This is a self-locking, one-piece unit which completely eliminates lock washers and wrenches. They are available in steel, aluminum, silicon bronze, stainless steel—plated to specifications, in sizes #4 through ⅜". Tapped class—2B. Produced by highly automated equipment, resulting in a low cost, quality product.

* * *

For further information, engineering assistance and samples, inquiries should be addressed to the Jacobson Nut Mfg. Corp., Box 177, Kenilworth, N. J.

Fastener Pricing And Nomenclature Simplified

Russell, Burdsall & Ward Bolt and Nut Company has further simplified pricing and nomenclature of industrial fasteners in its program of correcting the complicated discount system prevalent in the fastener industry. Suggestions from customers and distributors were incorporated into the new price lists and discounts, effective with November shipments, according to **John S. Davey**, vice president in charge of sales.

* * *

"Most pronounced need was for list prices having some degree of permanency so customers could figure costs accurately and distributors might use them in their catalogs," said Mr. Davey. To do this, some lists were revised so that they all bear a direct relation to cost. Changes can be taken care of by altering the discount, but issuing new lists is not anticipated for some time to come.

* * *

Much traditional fastener nomenclature has been dropped or revised, eliminating unnecessary words and making new terms more definitive. The term "Screw" has been adopted to describe a headed product furnished without a nut. The term "Bolt" is reserved for a product furnished with a

The PESCHEL line

ELECTRICAL TEST EQUIPMENT FOR THE Wire Industry

Low Cost - High Quality Sparker

Now - GUARANTEED FOR 5 YEARS

Model S14CV — AC/DC

FEATURES: RUGGED CONSTRUCTION WITH LONG LIFE SELENIUM RECTIFIERS • ACCURATE AT ANY SPEED • DC OR AC OUTPUT • FOR USE ON EXTRUDER OR RESPOOLER. ANY SPEED • 400 FPM WITH 1" ELECTRODE (2400 FPM WITH 6" ELECTRODE) • RELIABLE OPERATION DOWN TO 5% OF MAXIMUM OUTPUT VOLTAGE • SIMPLE TO OPERATE BY INEXPERIENCED PERSONNEL.

FOR BEST VALUE — SPECIFY PESCHEL SPARKERS

PE PESCHEL ELECTRONICS, INC.

TOWNERS, NEW YORK (Putnam County) Tel: TRinity 8-3251

nut, whether shipped in bulk or in packages.

* * *

The most important nomenclature change is to eliminate duplicate lists and multiplicity of names for identical hexagon-headed products. The term "Hex Screw" has been adopted for a product with a washer face and a controlled body tolerance. It replaces four other terms—Cap Screws, Finished Hex Bolts No Nuts, Hex Heads No Nuts, and SF Hex Machine Bolt No Nut through 1″x6″.

The term "Unfinished Hex Screw" now describes a product having no washer face and having wider body tolerances. It replaces the terms Hex Heads No Nuts larger and longer than 1″x6″, and Hex Machine Bolts No Nuts, etc.

New Ajax Gas-Fired Salt Bath Furnace

Uniquely designed for effective operation throughout the entire range from low to high heat treating temperatures, new gas or fuel fired salt bath furnaces intrdouced by **Ajax Electric Company** combine the economy of low cost fuels with the heat treating advantages obtained by molten salt immersion.

* * *

Operating to temperatures as high as 2300° F., these Ajax-Ankersen furnaces pave the way to economical heat treating in many applications where salt baths were previously impractical. Besides handling all ordinary operations they are well suited to heating for forging, billet heating, casting and other heavy duty work involving high tonnage volume.

* * *

Highly effective circulation of the bath is obtained by a patented "air bubbler" agitator. With this system, forced air is projected to the bottom of the bath through a series of metal tubes. This triggers a constant circulation that assures no more than 10° F. variation in any part of the bath working area. Uniformity compares favorably to that achieved by electrode-type salt baths.

* * *

Technical Bulletin 200 giving full details is available from Ajax Electric Company, Frankford & Delaware Avenues, Philadelphia 23, Pa.

Booklet On Aircraft Steels

A new booklet on the aircraft steels AM-350 and AM-355 is now being distributed by **Allegheny Ludlum Steel Corp.**, developers of these materials.

* * *

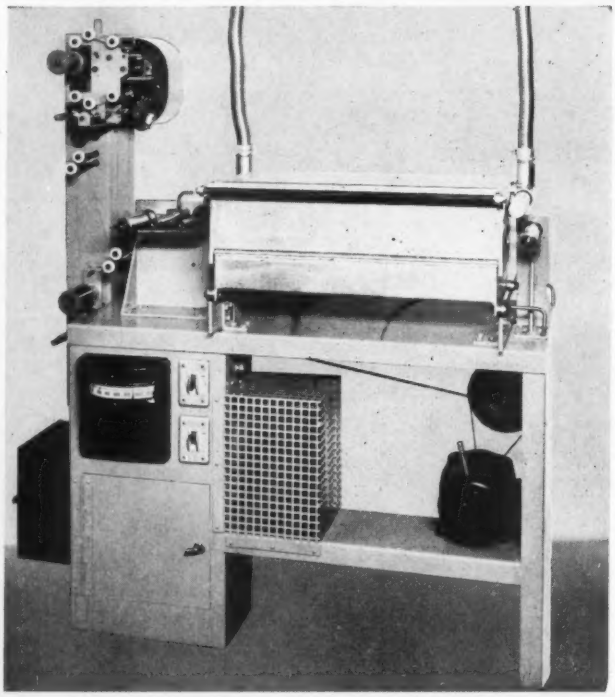
The 24-page booklet gives detailed information on their mechanical and physical properties at various temperatures. Also included are sections on heat treating, fabrication, including forming, forging, welding, brazing, and machining. Numerous tables giving detailed data are included.

* * *

While most of the current production of these two steels goes into the aircraft and missile fields, both AM-350 and AM-355 can be used for flat and coiled springs, corrosion resistant fasteners, dental and surgical equipment, saws and saw blades, piston rings, glass

HORIZONTAL FINE WIRE ENAMELING MACHINE

1247



SPEEDS 50-200 F. P. M.—WIRE SIZES DOWN TO .0005
EASY STRING UP

EST. 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
TRADE MARK
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.
MANUFACTURERS OF WIRE INSULATING MACHINERY AND ALLIED EQUIPMENT. MACHINERY MFG. TO CUSTOMERS SPECIFICATIONS.

We manufacture a full line of enameling machines from the heaviest flat wires to the smallest diameters.

OTHER PRODUCTS:

Taping machines; tinning outfits; spoolers; insulation winding machines; special machinery according to customers' specifications.

molds, pump and camera parts, etc.

* * *

A copy of the booklet can be obtained by writing to the Advertising Department, Allegheny Ludlum Steel Corp., Oliver Building, Pittsburgh 22, Pa.

Catalog for Process Industries

A new catalog guide of equipment for the process industries has been issued by **Allis-Chalmers.**

* * *

Included in the guide are descriptions of compressors, vacuum, centrifugal, axial flow and turbine pumps, and valves for fluid flow; crushers and grinding and roller mills for disintegration, mixing and agglomeration; vibrating and gyratory screens for dry separation; blade mills, pool washing screens and log washers for liquid separation; kilns, dryers, slakers, pelletizers, coolers, and liquid heaters for heat transfer.

* * *

The guide also covers electrical equipment for the complete process plant, electronic metal detectors, water conditioning equipment, chemicals and service, as well as car shakers, lift trucks, tractors, etc.

* * *

Copies of "Allis - Chalmers Equipment for the Process Industries," 25C6177P, are available on request from Allis-Chalmers, Milwaukee 1, Wisconsin.

Machine For Drilling Fine Holes In Hard Materials

A new machine for drilling ultra-fine holes in ultra-hard materials, such as synthetic jewels, rubies, wire drawing dies, and injector and other nozzles, has been announced by **Mechanique et Plastique S. A.,** 114, rue de Carouge, Geneva, Switzerland.

* * *

The heart of the machine is a high frequency rotating spindle (60,000 to 80,000 rpm), with axial vibrations of variable intensity. A lateral lever feeds in a part to be drilled, conveying it to an automatic chuck. At the end of its travel, the lever releases a drop of abrasive mixture to the part from a mixer cup.

* * *

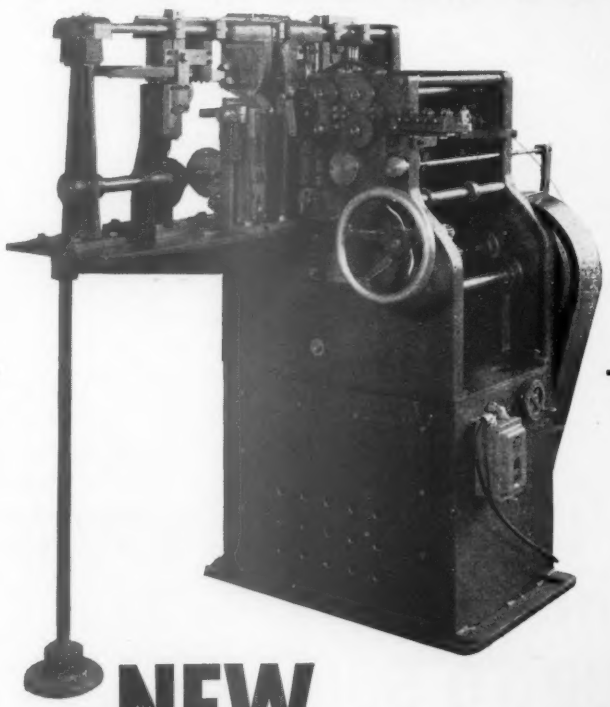
While the feeding lever returns for the next part, the MP Spindle comes down, drills the hole and pulls back, the chuck then releasing the part. Another lever removes the finished part and drops it into a mobile container—and the work cycle is repeated.

* * *

A group of 30 MP machines can drill 8000 to 12,000 holes in 8 hours under the control of one operator. The work is automatically performed and holes are uniform and smooth.

* * *

A bulletin picturing and describing the machine is available on request to the manufacturer.



NEW For Springmakers

AUTOMATIC COILER and LOOPER

WELLS' NEW FULLY AUTOMATIC SPRING COILING AND LOOPING MACHINE coils, trims and loops in sequence. By trimming before looping extremely accurate springs are made. Produces cross-over, machine and side loops, or any combination of these.

Machine shown above handles .025" to .062" diameter wire, forming coils of 3/16" o.d. to 5/8" o.d., 1/2" to 5" long.

Loops on each end can be varied 360° to each other and held to ±3°. Loop openings can be held to ±.010", or less.

Adapted from the WELLS large diameter automatic coiling and looping machines made for several years, this new spring machine will be a boom to manufacturers of mechanical coil springs.

Made By The Producers of the Wells Straightening And Cutting Machines.

Write for information

Frank L. Wells Company

BUILDERS OF FINE WIREWORKING MACHINERY

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

OR — HARVEY SPRING MFG. CO. — 671 N. Sangamon St., Chicago, Ill.

The Drawing of High Carbon Steel Wire at High Speed

(*Continued from page* 200)

of wire produced in normal production runs.

TABLE 5.

Size drawn inches	Tensile tons p. s. i.	Coating	Machine Size Inches	Speed f. p. m.	Effective hours worked	Weight produced lb.	Potential production lb at 100% efficiency
048	119/127	Black	18	3000	8	8486	8925
042	100/110	Black	18	3000	8	6480	6800
034	120/129	Black	12	3500	8	4742	5200
026	85/95	Galv.	12	3500	8	2870	3055
021	120/130	Black	8	3500	8	1881	1992
017	120/130	Black	8	3500	8	1260	1303
015	100/110	Black	8	3500	8	972	1016
0105	100/110	Black	8	3500	8	476	498

It must be noted that the production figures shown in Table 5 are being consistently produced by operators who have been transferred from overhead, non automatic machines running at the slower rate of 2000 ft. per minute.

* * *

The increases in productivity are approximately as follows:

18″ machine 50%
12″ machine 75%
8″ machine 75%

* * *

These figures can be achieved without specialised labour if time is given to training operators in high speed drawing. It must be realised that in terms of effective time, 100% spindle efficiency is not always fully maintained, due in part to irregularities in the steel available.

* * *

It is hoped, however, that with the co-operation of the Steel makers/Rod rollers, a better and more uniform quality will be produced to enable High Speed Wire Drawing to be carried out at the desired 100% efficiency.

Standard Wire To Treble Plant Size

Standard Wire & Cable Ltd., Toronto, Canada, has bought a 14-acre site on the West side of highway No. 27 and has broken ground for a $1 million head office and factory covering 130,000 square feet. The move from the present plant on Wingold Avenue is scheduled for March 1960. It will be a threefold expansion.

* * *

The new equipment being installed in the plant is said to be unique; it will be controlled largely by automatic electronic devices. Over 250 types of electric wire and cable will be manufactured. The new operation will employ 225 people.

Furnace Firm Acquired By Midland-Ross

Henry M. Heyn, President of **Surface Combustion Corporation,** Toledo, Ohio, has announced that Surface Combustion has been ac-

STRAIGHTEN AND CUT WIRE UP TO 500 FPM

This is the most outstanding development in the field . . . the new Lewis No. 4FHA Wire Straightening and Cutting Machine designed to straighten and cut wire in any lengths at speeds up to 500 FPM.

Through the use of a compound sliding-gear transmission 24 gear combinations permit 20 feed speeds — 75 through 520 FPM with 6 flywheel speeds of 95 through 305 RPM. Another outstanding feature is the Dual-Center Straightener Arbor (Pat. Pending) permitting the use of close centers for small diameters and long centers for the larger diameters thus making possible precision straightening over the entire range of the machine.

Lewis No. 4FHA Travel-Cut Automatic High-Speed Flying-Shear Wire Straightening and Cutting Machine with Wichita Air Clutch and Air Brake.

Capacity: Mild Steel 3/32″ to 1/4″ diameter. High Carbon, Alloy & Stainless 3/16″ Maximum.

Other models up to 1″

THE LEWIS MACHINE COMPANY
3441 EAST 76TH STREET • CLEVELAND 27, OHIO

quired by The Midland-Ross Corporation, and will hereafter be known as **Surface Combustion, A Division of Midland-Ross Corp.** The business will be operated without change of personnel, with Mr. Heyn retaining his post as president of the division.

Opens Sales Office In North Carolina

The Titan Metal Mfg. Co., Bellefonte, Pa., a division of Cerro de Pasco Corp., has opened a mill sales office in the Guilford Bldg., Elm and Washington Streets, Greensboro, N. C., with **C. L. Miller** as district sales manager. The company makes brass, bronze, and aluminum rod, wire and wire products.

Alpha Wire Opens Pacific Division

To provide better and faster service in the 13 Western States, **Alpha Wire Corporation,** 200 Varick Street, New York 14, N. Y., has recently opened a new Pacific Division of factory facilities, warehouse, and offices at 1871 South Orange Drive, Los Angeles 19, Cal. **Donald Rappaport,** formerly Assistant Sales Manager, will head the new Pacific Division as Manager. Alpha Wire manufactures a comprehensive line of diversified electronic wire, cable, tubing and sleeving products.

* * *

"Our new Pacific Division will now enable us to make immediate deliveries to our Western State customers on the more than 5,000 items in our electronic wire and cable line. It will also speed up service of our custom cable work, since the new Pacific Division includes special facilities for custom cable manufacture", **Howard B. Saltzman,** General Manager of the company, stated.

Publication on Plating & Polishing

The "H-VW-M Plating and Polishing News," has been made available to the metalfinishing trade. The quarterly publication is issued by **Hanson-Van Winkle-Munning Company,** Matawan, N. J., and is now in its twelfth year of publication.

* * *

Readers will be able to keep abreast of the times with this four-page (11″ x 17″) brochure featuring the latest equipment, supplies and processes made possible through the research and development laboratories of H-VW-M.

* * *

In the September, 1959 issue, H-VW-M gives technical details about its new standardized rectifiers, Zincalume process for bright zinc plating, new shape nickel anodes, low cost stainless steel compounds, Fleximatic . . . (the latest in processing conveyors), recent plating barrel developments, plus other items of interest.

* * *

If you wish to be placed on the mailing list to receive future copies of the H-VW-M Plating and Polishing News, send the company your name, title, company's name, street address, zone number and state.

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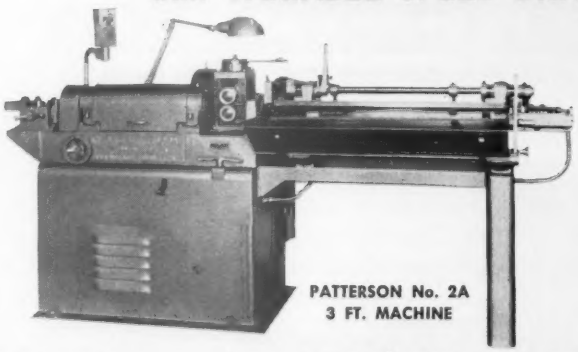
HI-SPEED
AUTOMATIC WIRE STRAIGHTENING & CUT-OFF MACHINES

ELECTRICALLY OPERATED
with VARIABLE SPEED DRIVE



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3 FT. MACHINE

We are proud to present this machine & 35 additional models to the mills and fabricators of wire, for we honestly believe they are top value in their field today. We have spared no expense to give you a precision machine tool that will give years of uninterrupted service. All iron castings are close grained Meehanite iron; cut-off and opener levers are high grade steel castings; all guides are hardened tool steel; electrical equipment is wired ready to run.

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FOR WIRE CLEANING, too, PERMAG offers a group of completely tested formulas that will eliminate pickling trouble and speed drawing production.

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PRODUCTS CORPORATION
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In Canada: Canadian PERMAG Products, Ltd., Montreal

Properties Of Resistance Cross-Wire Welds In Stainless Steel Wire

(*Continued from page* 181)

and 304 welds considerable recrystallization (solid phase welding) was found at the weld interfaces. In the dissimilar welds a very sharp thin line of demarcation was found at the interface. No recrystallization was evident on these welds.

Recommendations

In conducting this investigation on cross-wire welding of stainless steel the effect of such variables as wire condition, grade, size and welding conditions on tensile strength and weld appearance have been determined. By correlating these variables, recommendations can be made for producing welds in various wire sizes of a desired strength and appearance.

* * *

Maximum cross-wire weld tensile strengths can be obtained when welding times of 30 cycles are employed to make welds having a mutual indentation of 30%. The welding pressure and tensile strength of the completed weld for the size wire being welded can be obtained from Fig. 12. The technique then used for producing consistent welds is first, adjust pressure and select the time; and second, use sufficient current to produce a mutual indentation of 30%. Once an electronically controlled resistance welder has been set up in this manner, production quantities of welds having consistent quality can be produced with a normal periodic quality control.

* * *

In the fabrication of stainless wire items when appearance must be given consideration, a reduction in mutual indentation to 20% and shorter welding time (4 cycles) is effective with only a moderate loss in tensile strength.

A Few Important Facts About Lubricants

(*Continued from page* 194)

whether oil or grease is used, but the wire draws somewhat better with oil.

Tallow

With tallow we can pass the wire about three or four times through the dies without putting any new tallow on the wire surface, but with special dry soap, under certain conditions, about seven holes. In bar drawing tallow is successfully used, especially in England. Soap drawing is definitely a great deal cheaper than grease drawing, but the soap drawing method has one big disadvantage, in that it sticks too much to the machines used for making wire products and makes them dirty. In addition to these facts already mentioned, greases can generally be removed from the wire more easily than soaps.

Barm

Barm has proved its worth as a lubricant for many years, but its big disadvantage is that it has a horrible smell and for most workers it is unpleasant to work with.

* * *

Barm was therefore replaced in many mills by up-to-date synthetic grease lubricants.

* * *

But barm has some distinct advantages over other lubricants of its kind with respect to die life and, furthermore, it gives a bright and shiny finish on bars and coppered wire.

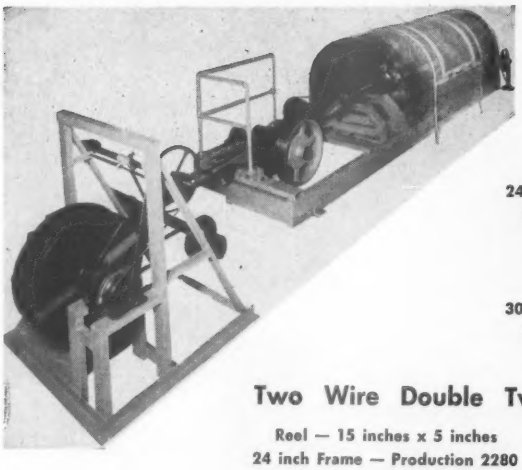
* * *

There are many excellent wire drawing compounds on the market for the great variety of metals and drawing conditions, but mention of them would overstep the bounds of this article.

Wire Braiding

(*Continued from page* 188)

It is essential that braiding machine manufacturers adhere to extremely high standards of workmanship, but due to the fact that they are relatively few in number it is not always possible to obtain on-the-spot advice about some of the peculiar troubles that occasionally arise.



TWO WIRE
SINGLE TWIST
TWINNING MACHINE

— Reel 24 inches x 16 inches
24 inch Frame — Production — 1140
Twists per minute — Power 3 H.P.

•

Reel — 30 inches x 16 inches
30 inch Frame — Production — 1000
Twists per minute — Power 3 H.P.

Two Wire Double Twist Twinning Machine

Reel — 15 inches x 5 inches
24 inch Frame — Production 2280
Twists per minute — Power 3 H.P.

Reel — 24 inches x 12 inches
30 inch Frame — Production 2000
Twists per minute — Power 5 H.P.

All Double Twist Machines are equipped with our Patented Constant Tension Over Run Prevention Devices. Take-Ups are engineered to run with these high speed machines and have tensions which can be quickly adjusted while in operation and Over Run Prevention Devices eliminating wire draw down on stopping.

All machines have Open Sided Capstans and Quick Loading Cradles for high production and ease of operation.

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EQUIPMENT
Extruders
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All Types of Reels and Spools
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Bare, Tinned and Silver Plated Copper Wire, Stainless Steel, Silver, Nickel, Bronze, Brass and Other Bare Wires
Numerous Other Items

all the wire industry in the West looks to 2 companies

First, there's Western Wire & Textile Machinery, Inc., the only company in the West that deals exclusively in used and reconditioned wire and cable-making equipment.

Secondly, there's the Paul I. Kenner Co., supplier and distributor of new wire and cable manufacturing machinery and supplies.

Nowhere else in the West will you have a better chance of finding exactly what you need---either new or used. Nowhere else in the West will you be able to trade in old equipment on new. Nowhere in the West will you find such a complete stock of machinery and equipment.

You'll like dealing with men who speak your business language---with companies backed by 20 years of highly specialized experience.

SOME EQUIPMENT ON HAND:

Takeups • Payoffs • Braiders • Asbestos Carding Lines • Taping Machines • 13 Die Copper Rod Breakdown Machine with Cook M-1000 Spooler Takeup.

2 Two companies that provide all that's needed, new and used for the West's wire industry.

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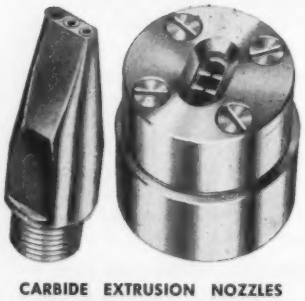
INSULATING DIES AND NOZZLES
for
EXTRA-HIGH ELECTRIC WIRE PRODUCTION



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CENTRAL STEEL DIES are made in Round, Figure 8, Serrated, Tracer, and other special shapes to your specifications.

A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed, and the whole reassembled easily and quickly. Made for 2 and 3 conductor wires to be coated in extrusion machines.

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LEADER IN HIGH PRODUCTION EXTRUSION TOOLS FOR ELECTRIC WIRE

Chemically Cross-Linked Polyethylene for Wire and Cable—Progress Report

(*Continued from page* 197)

filled and unfilled polyethylenes.

* * *

The carbon black-filled compounds in the table show considerably poorer electrical properties, permitting their use in only non-critical applications such as line wire, aerial secondary, service drop cable, and power-cable jacketing. The increase in breakdown voltage in the filled, cured compound from 150 to 300 volts/mil is probably caused by the removal of peroxide decomposition products during the 14 days aging at 120°C. The filled, peroxide-cured samples tested have excellent U.V. resistance and storage life. Other experimenters report improved ozone resistance for this type of material. In unfilled cross-linked resin, power factor is slightly higher because of the presence of peroxide decomposition products. These residues tend to exude and cause an odor. However, such effects can be nearly eliminated by steam treatment, performed in line with the extruder using a continuous high pressure steam vulcanizer. Oven treatment can also be used. After removal of most of these residues, the electrical properties are improved to nearly those of unmodified polyethylene. In applications such as shielded power-cable jacketing where excellent electrical, thermal, and stress-crack properties are required, unfilled cross-linked polyethylene compounds are suitable.

Observations in European Wire Mills

(*Continued from page* 203)

doubtful about their ability to draw wire from this furnace without cleaning. However, on my return the next day, I saw this .120 -.50 carbon wire being drawn on a frame at 300 ft. a minute down to .080 with a very good finish.

* * *

Having no cleaning house, and requiring annealed wire to be drawn to smaller sizes, this mill was installing a similar furnace,

designed for annealing low carbon wire.

* * *

Generally, I found the mills visited quite efficient, slowly improving their techniques, and installing better equipment. In 1955 the French mills were paying $75 to $80 per ton for low carbon rods. In no place did I find average hourly earnings above 60c per hour.

* * *

At a small mill located in Montreuil in western France I was told that the company owned houses containing kitchen, living room, two bedrooms and bath rented for 500 francs per month—equal to $1.43 in 1955. Houses were good looking, with a fair-sized garden space available.

* * *

A large number of women are employed, particularly in weighing and packing wire nails in 5 kg. paper containers. This is all hand work. The operator makes her own paper container by winding paper around a wooden plug 12" long by 3½" square, tying it with string and leaving one end open. She then weighs into a pan, on a balanced scale, the 5 kg. of nails, uses the pan as a funnel to empty the nails into the container, then ties the end to close it. Average 8 hour production is 3000 pounds. I insisted this operation should be mechanized, but was told it could not be done, as nails could not be unscrambled and fed uniformly into a package.

* * *

Having made the statement that the work could be mechanized, I was challenged to develop a satisfactory machine. This I am pleased to say I have accomplished. The machine is capable of weighing and packing 1500 lbs. per hour of nails in 10 lb. containers. It is operated by one person and is completely automatic.

* * *

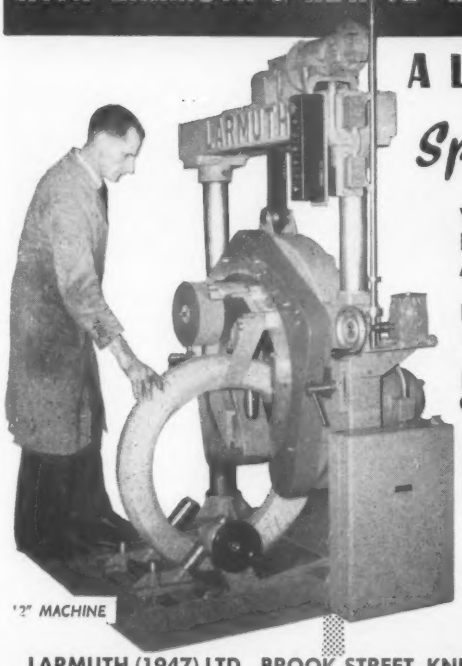
The development of a successful wire mill without a cleaning house, compared to their antequated method of packing nails, shows what can be done when the necessity arises.

* * *

Workmen in France and Belgium enjoy about the same bene-

HEAVY COIL WRAPPING MADE EASY WITH LARMUTH'S NEW 12" MACHINE

Now Glues The Paper As It Wraps



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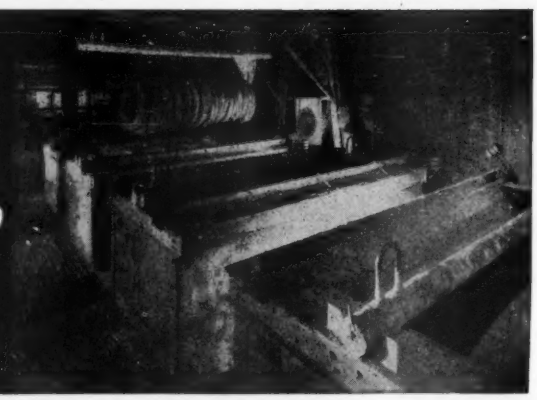
HI-SPEED REGISTERED

ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

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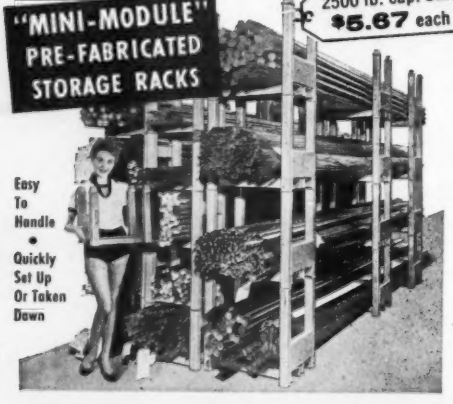

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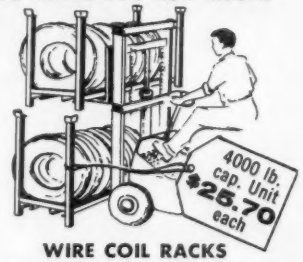
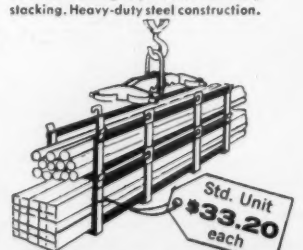
Jarke Mini-Modules give you storage when you want it, where you want it. Easily set up or taken down, no bolts, no tools, no fittings. Special "nesting" caps provide fast stacking and insure rigid, no-slip interlocking tiers. Sturdy steel construction. Lightweight. Four standard sizes. Send for details now!



4000 lb. cap. Unit $26.70 each

WIRE COIL RACKS

Designed for stacking coiled material, these racks have four-way entry for fork truck, open ends for ram-type deposit of coils. Nesting caps insure fast easy stacking. Heavy-duty steel construction.



Std. Unit $33.20 each

PORTABLE BAR RACKS

Unique crane grab permits load centering and rapid fool-proof engagement. Automatic grab also available. Assorted standard sizes. Specials to order.

JARKE MANUFACTURING COMPANY

6333 Howard St.
Chicago 48, Illinois

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

fits as they do in the United States. Vacations, sickness and accident insurance, also collective bargaining, are all available. I was told that "Fringe Benefits" in Belgium equalled about 30% of the wage cost. The workmen are unionized, but not in one union. Each political party has its own union, therefore, in France there may be 10 unions in one factory.

* * *

Since visiting these French and Belgian wire mills I have concluded that in spite of inferior equipment and wire drawing speed those mills which are gradually improving equipment can easily undersell our domestic mills. This is particularly true in the more common wire products, because labor costs are less than one fifth of such costs in the United States.

Modern Methods of Annealing Wire

(*Continued from page* 209)

One of the faults of annealing soap drawn wire for further drawing in such a controlled atmosphere is the deposition of a sooty film, a product of the cracking of the soap, which is not soluble in hydrochloric acid. This causes a poor finish on the wire after drawing and is overcome by deliberately creating an oxidising atmosphere while the charge is at its maximum temperature. Air is injected into the bell cover at the rate of 400 cu. ft. for the first half-hour of soak, and is then reduced to 200 cu. ft. until the removal of the bell. The annealed wire then has a slightly scaled surface, which cleans more readily in hydrochloric acid. This may appear to be a waste of steel but is actually the lesser of two evils.

* * *

Use of ammonia atmosphere alone is not recommended for the annealing of medium and high carbon steels. Chemical reaction causes carbon to be attracted from the surface of the wire and goes off as carbon monoxide. This is called "Decarburisation" and creates a soft skin on the wire's surface which is invariably detrimental to the purpose for which the

wire is intended. Decarburisation is off-set by the introduction of propane at a temperature just below the point where recrystallisation would commence The propane gas breaks down into carbon monoxide and prevents absorption of carbon from the wire's surface.

* * *

In conclusion it must be stated that present-day specifications are so numerous and complex that the foregoing must inevitably lack much detail, but may form a guide to general annealing procedure and modern methods of application.

Wire Kinks

(*Continued from page* 213)

mon in the United States. A .250 rod, four holes to .135 at 800 to 1000 feet per minute followed by an anneal, a recoating operation, then the .135 wire is drawn to .067, annealed, recoated, then the .067 wire is drawn to .131. The lubricants mentioned in paragraph #3 are used in each die box. These lubricants are powders and roll freely and work freely in the die box.

If your reader desires any more information, we will be happy to assist him.

Reply No. 6.

In reply to your letter, I am pleased to submit the following information, regarding the five questions asked.

(1) Our cleaning is accomplished in molten caustic, followed by a short acid dip.

(2) After the wire is cleaned, it is repeatedly dipped and dried in a hot air blast, in a solution of lime, concentration of which is 4 to 6 oz. per gallon, maintained at 108 degrees F. The immersion and drying are continued until a good coating is built up.

(3) Powdered soap is used for drawing.

(4) Tungsten carbide dies are used with a 16 degree approach angle.

(5) Drawing speeds vary from 600 feet per minute in the larger size range, to 1000 feet per minute in the smaller size range.

The Completely NEW Robert J. Emory SPOOLER

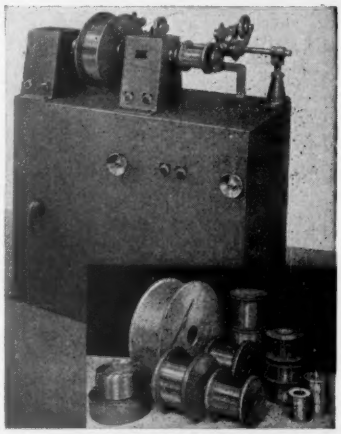
1. Automated—Multi-Spindle
2. Tandem operation with individual speed control
3. Synchronized or individual run-stop control
4. Automatic traverse start with either or all winding heads
5. Controlled acceleration rate
6. Jogging of individual winding heads
7. Provision for each winding spindle to stop when wire breaks
8. Full spool detector on each spindle

The New Model 1900-HVE Multi-Spindle Spooler (up to 16 Heads), engineered to include a variable speed system for adjustment of spindle speed, pitch, and traverse. This complete flexibility of adjustment makes a very uniform layer wound package which prevents binding and kinking during pay-off.

The 1900-HVE Spooler is a ruggedly built machine, using precision ball bearings at all rotating members. The adjustments are repeatable, and easily made while the machine is running. It is completely adaptable to the changing demands of the wire industry. A speed range of 18 to 1 is available. It contains the knowledge and experience of over 60 years of wire machine building.

Your special requirements can be incorporated in the design.

You are invited to consult us on your wire spooling problems. Our engineering resources and years of experience are at your service. Emory Winding Machines have been the standard of the industry. Most every major plant has Emory equipment.

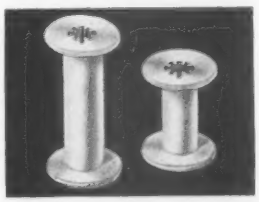


SPECIFICATIONS

Size Range: .010" to .080" or heavier if soft, and many flat wire sizes. Max. Spool Size: 16" flange diam. Capacity: Usually 2 to 6 spindles.

ROBERT J. EMORY COMPANY
31 East Runyon Street Newark 5, N. J.

PLAMENCO Nylon SPOOLS



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WIRE BRAIDERS
- ACCURATE AND DURABLE
- MADE IN STANDARD 16 AND 24 CARRIER SIZES

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WIRE SPOOLS

Protect your wire with "PLAMENCO" for best results.

WE INVITE YOUR INQUIRIES

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NYLACLAD PLAMENCO DIV.
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Wire Fabricators

PRODUCERS OF QUALITY FINE WIRE
COPPER CONDUCTORS

SOLID • BUNCHED • STRANDED
OR BRAID

BARE • TIN OR LEAD COATED
AND SILVER PLATED

"Prebond"

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A RUGGED, DEPENDABLE
Wire Measuring Machine
for fast, accurate runs!

Wire is easily "loaded" into measuring machine from the side or the rear without having to feed through guide bushings. Brake stops measuring wheel instantly when wire leaves measuring rolls. Predetermined units will automatically stop wire at desired length. Very accurate speeds to 2500 ft. per minute.

MODEL "L-25"
Capacity .030 to 1 in. Tachometer to govern rate of speed is optional.

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SINCE 1879
Count Everything

Vail Redesigns Paper Clip Package

One of the most familiar, albeit anonymous, of all consumer product packages has been deliberately abandoned by the world's largest maker of paper fastening devices.

* * *

It's the little cardboard box, orange in color, in which literally billions of Monarch brand gem clips, at 100 clips per box, have been sold by **Vail Manufacturing Company,** Chicago, over a period of more than half a century.

* * *

The orange cardboard of the former package, susceptible to fading, is succeeded by a flat-white stock imprinted in a light orange-red that marks the paper clip boxes as the old ones. Other basic products are also color keyed: dull gold for brass fasteners, magenta for pins, bronze for tacks, and blue and black for staples.

* * *

An island display unit offers self-service merchandising of Vail's most widely used products. Called the Monarch Fastener Center, the unit projects the package design and is built for point of sales appeal, maximum capacity, and minimum counter space.

Literature on Bolt Tension Calibrator

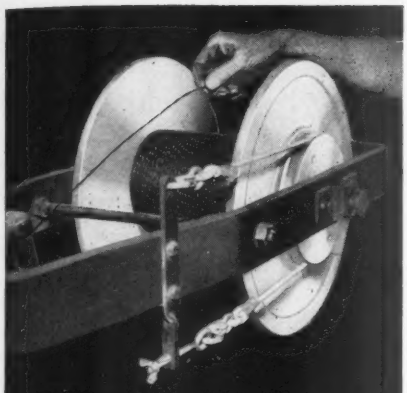
Design engineers will be interested in new literature now available from the **Skidmore-Wilhelm Manufacturing Co.,** describing its bolt tension calibrator, now in use at Buick's plant in Flint, Michigan.

* * *

Buick Motor Division of G.M.C. found it could reduce threaded fastener inventory and still do a better job by duplicating actual production line conditions in the laboratory to test torque-tension relationships for different bolt, nut and washer combinations. The basic tool around which their testing equipment was built is the Skidmore-Wilhelm calibrator.

* * *

The free literature, a reprint of a feature article, may be had from Skidmore-Wilhelm Manufacturing Co., 442 South Green Road, Cleveland 21, Ohio.



"Why We Switched To Bobbins Made Of Molded Fiber Glass"

Bobbins made of molded fiber glass are used by one of the nation's largest producers of insulated wires and cables because they increase production and lower labor costs.

After long testing, this company switched from conventional steel and wood to a 16-inch plastic bobbin made by the Molded Fiber Glass Tray Co. of Linesville, Pa. (see photo)

The chief engineer for the wire and cable producer said fiber glass bobbins are stronger, even in the thinner sections. They hold more wire—up to a a mile of it—because they can be reduced in thickness.

Molded fiber glass bobbins are competitive in price . . . need no maintenance . . . don't bend, dent or rust . . . can't throw off chips. Smooth surfaces permit precise winds and eliminate breaks and tangles.

You can profit by this manufacturer's experience. Just mail the attached coupon today.

by TOTELINE

MOLDED FIBER GLASS TRAY COMPANY
LINESVILLE, PA.
World's largest producer of molded fiber glass products for materials handling.

I'd like more details on how molded fiber glass bobbins speed production and reduce costs.

Name_____
Title_____
Company_____
Address_____

MF3 WWP

"Teflon" Film Prices to be Dropped

The extraordinary properties of "Teflon" fluorocarbon resins will soon be available commercially in the form of thermoplastic film, **Du Pont's** Film Department has announced. "Teflon" is an engineering material with a reputation for outstanding performance, particularly in difficult applications.

* * *

Made only in development quantities to date, the FEP-fluorocarbon film will be produced commercially beginning late this year. When commercial production begins, the base price will be dropped from the present $29 a pound to $15 a pound. The new base price is about 17 cents per square foot per mil.

* * *

Further substantial price reductions as volume increases and manufacturing efficiencies are improved are expected to be made.

Booklet on Speed Reducers

Information on industry's most complete line of helical gear speed reducers is contained in Book 2751, just published by **Link-Belt Company.** This 20-page book consolidates all of the company's expanded line of In-Line helical gear speed reducers in a single catalog.

* * *

"In-Line Helical Gear Speed Reducers" provides complete selection data on 20 reducer sizes in double, triple and quadruple reductions. It contains tables of load classes and service factors for all In-Line helical gear speed reducers.

* * *

A copy of Book 2751 can be obtained by writing to Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Illinois.

New Mechanical Drive Bulletin Available

The Louis Allis Company recently published a six page Bulletin 3600 on the "Allispede" mechanical adjustable speed drive, which has broad applications in industry. The drive operates on A. C. power, offers speed ranges up to 8:1 and is available in ratings from 1 to 30 HP.

* * *

Wire dies have longer life when finished with HYPREZ DIAMOND COMPOUNDS

For every job, Hyprez quality, economy and dependability are recognized as unsurpassed. Your nearby Hyprez distributor will help you solve any difficult lapping or finishing problem that may arise.

Ask for a Free Demonstration or Technical Bulletin HW-20

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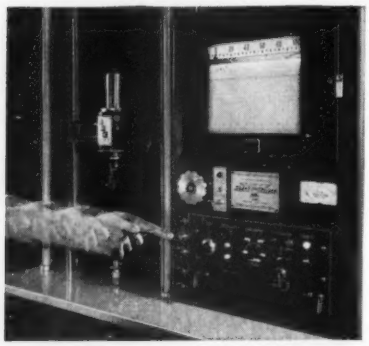
Chicago 5, Ill.

THE SURE TEST . . . SCOTT!



NEW PUSH-BUTTON CONTROL SIMPLIFIES PHYSICAL TESTING

THE SCOTT MODEL CRE Constant-Rate-of-Extension Tester offers you the ultra-high accuracy of inertialess electronic weighing . . . *plus* effortless automatic operation that takes the work and weight handling out of physical testing! At a touch, the simple finger-tip controls of the Model CRE provide a variety of crosshead speeds, complete crosshead control and a wide range of test capacities . . . enabling even the non-technical operator to obtain detailed test results faster, easier, and *at amazingly low cost!*

VERSATILITY is another time-and money-saving feature of the Scott CRE Tester. This simple yet super-sensitive tester is designed for use with Scott's more than 150 different clamps and holding fixtures to meet ASTM, ISO and Industry Test Methods and material requirements. Moreover, Model CRE can be set up quickly for tensile, tear, adhesion, burst, seam construction and many other physical tests . . . with ranges from the lowest up to 1000 lbs. or 500 kgs.

FOR PRODUCT DEVELOPMENT, QUALITY CONTROL, and countless other tests that make the difference between profit and loss . . . you can be sure *your* product's qualities meet industry standards, when you make the sure test . . . Scott!

Write for CRE Brochure TODAY!

Scott Testers, Inc.
55 Blackstone Street
Providence, Rhode Island

SCOTT TESTERS
THE SURE TEST . . . SCOTT!

The bulletin gives engineering and application information, including a cutaway view of a typical Allispede unit. Also illustrated are modifications to the basic drive, such as remote controls, mounting flanges, brakes and remote speed indicators. Graphs point up the speed regulation benefits gained by using a synchronous induction motor (optional) in the drive

* * *

For a copy, please write The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis.

New Line of Large Induction Motors Announced

The Louis Allis Company has announced the availability of a new line of Large A. C. Induction Motors in open drip-proof enclosures in ratings from 150 to 2000 HP at 1800 and 3600 RPM. This is the most complete line of redesigned motors of this type now available and is intended for industrial applications requiring higher horsepower, constant speed motors.

* * *

These motors serve as drives for pumps, fans, blowers, and compressors in industry. They are also being applied in Air Conditioning, Refrigeration Power Plant, Primary Metal Processing, and similar installations, and can be used on high capacity machine tools, conveyors, punch presses, and other specialized machinery.

* * *

For complete information, request Bulletin 3350 from the Louis Allis Co., Dept. P, Milwaukee 1, Wis.

Aluminum in Automobiles

Completion of the first comprehensive study of aluminum in automobiles was announced in September by **David P Reynolds,** executive vice president of **Reynolds Metals Company.**

* * *

The book, "Aluminum in Automobiles," result of a $100,000 two-year research and editing program, will be presented to automotive industry leaders and newsmen during Automotive Night

CUT Die Room COSTS 50% with the New type "M"

DYKREX
"IT CORRECTS THE DIE"

automatic Polishing Machine

Double your finished Tungsten Carbide Die production

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It is completely assembled—just plug it in!

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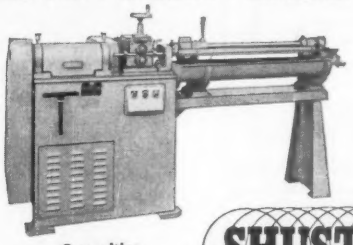
NEW SHUSTER

Wire-Straightening & Cutting Machine with "Unitized Construction" ...Improves your product while it cuts your costs!

Model 1AVS — a New "Production Booster"
VARIABLE SPEED • AUTOMATIC • ELECTRICALLY CONTROLLED



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Capacities
1AVS-5—3/32" to 1/4"
1AVS-3—1/16" to 3/16"

• Rigid, "Unitized Construction" gives amazingly smooth, quiet performance • New electro-mechanical positive release target eliminates jamming • High-speed straightening arbor boosts production • Infinite variable speed control • Timken bearing-equipped feed-roll housing—gears running in oil • Larger catch pan • Ideal working height.

WRITE FOR DETAILS TODAY!

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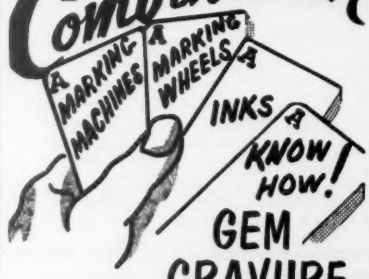
An UNBEATABLE Combination



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10 Models of Precision-built Markers for Printing, Striping or Embossing.
MARKING WHEELS:
NEW-Hardened Gravure wheels give years of service. Reproduction of any Type face or Trade-mark.
INKS:
For Hot or Cold applications in Navy-Chip Colors. Our inks have passed all present solvent and abrasion tests.
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230 Shaw Rd., South San Francisco, California

ceremonies in the dedication of Reynolds new Great Lakes Region Headquarters Building in Detroit.

* * *

Dedicated to automotive men "whose dissatisfaction with the present assures our progress for the future," the 102-page volume covers the past, present and future uses of aluminum in the production of passenger cars in this country and abroad. It is illustrated with 237 black-and-white pictures and 28 color photographs.

Booklet Describes Adjustable-Speed Drives

A new twelve-page, two-color booklet published by **Reliance Electric and Engineering Company** gives detailed performance and application data on the complete line of Reliance all-electric, adjustable-speed V*S Jr. drives. Covering typical applications employing V*S Jr. drives from 1/8 through 4 horsepower, the booklet is illustrated with photos and drawings. Condensed specifications, dimensions, and a gearmotor selection table are included.

* * *

Copies of the new booklet, Bulletin D-2507, are available free by writing Reliance Electric and Engineering Company, 24701 Euclid Ave., Cleveland 17, Ohio.

Bulletin Shows Larger Line of Couplings

An expanded line of Dodge Para-flex flexible cushion couplings ranging from fractional to 190 hp per 100 rpm is described in a new 12-page bulletin.

* * *

Two new sizes have been added to the 10 previously offered to increase the scope of industrial applications for which the coupling can be used. New PX24, largest in the line, is capable of delivering up to 2,000 hp at 1080 rpm. This is 2½ times the maximum horsepower of the largest Para-flex previously offered. Photographs, drawings and text explain design features and operating characteristics of Para-flex.

* * *

The rubber-tire type coupling accommodates angular misalignment, parallel misalignment and

For WIRE DRAWING

Warner

BELL MINE LIME PRODUCTS

Strict laboratory control assures uniform quality

Pulverized Quick Lime
Hydrated Lime
Pebble Lime

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MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .250"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.
Dental and Surgical Wires, large assortment.

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2514 Vestry Ave. Established in 1884 **Cleveland 13, Ohio**

Specialists in GENERAL MACHINE WORK for the
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Wire machinery built to customers' specifications.

Wire Flattening Machines —:— Rolls (Ground or Plain)
Spoolers —:— Coilers —:— Draw Benches —:— Et Cetera

Send us your requirements and specifications for quotations.

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Open hearth grades from low metalloid through high carbon, Thomas grades, cold heading and special grades for sensitive applications. Heavy coils up to 880 lbs.—I.D. up to 33½". Sizes from .200" to ¾".

Reliable delivery schedules at a fair price.

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Stranders — 7-bay and 12-bay.
1 Davis Standard 48" Dual Capstan complete with Drive.
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WIRE & TEXTILE MACHINERY INC.
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end float—singly or in any combination. It also cushions shock loads and diminishes torsional vibration.

* * *

Ask for Bulletin A669C, **Dodge Manufacturing Corporation,** Mishawaka, Ind.

Booklet on Welded Wire Reinforcement

Free copies of "Welded Wire Fabric Reinforcement of Asphaltic Concrete Overlays" are now available through the **Wire Reinforcement Institute.**

* * *

Those interested in learning of the latest developments in the reinforced asphalt process may obtain a copy of the 16 page illustrated booklet by writing the Institute, Dept. 238, National Press Building, Washington 4, D. C.

Straightening Machine Announced

A new two-plane Sutton 2L Shape Straightener has been announced for the high-speed straightening of steel and non-ferrous flats and shapes such as squares, hexagons, angles and other similar sections. A recent installation for Hunter Engineering Co. is for the accurate straightening of ⅜" to 1¾" aluminum alloy hexagons and squares at speeds to 300 f. p. m. A larger version of the same design, known as the 2½L Modified, has been built for Wyckoff Steel Co. for straightening ½" to 2½" squares and hexagon cold drawn steel bars. Another 2½L Modified has been installed at The Cold Drawn Steel Plant of Western Automatic Machine Screw Co., Division of Standard Screw Co., Elyria, Ohio, for hexagons from ⅝" to 2½" and squares from ⅝" to 2¼". For additional information, write manufacturer: **Sutton Engineering Co.,** Pittsburgh 22, Pa.

New Offices Opened by Welding Machine Firm

National Electric Welding Machines Co., Bay City, Mich., major producer of special, standard and automatic resistance welding machines, has established three new sales offices and has extended cov-

erage of its existing Chicago office.

* * *

A new West Coast office, covering the northern half of California and all of Oregon and Washington, is manned by **William M. Corns** of Ross, Calif.; **William E. Dowling**, vice-president of R. E. Duboc Associates, Denver, will service the five-state territory of New Mexico, Utah, Wyoming, Idaho and Colorado; a new southern office, covering parts of Mississippi and Georgia and all of Tennessee and Alabama, is serviced by **H. J. Yarbrough** of Welding Alloys and Supply Co., Inc., Birmingham, Ala.; and to assist the Chicago office in the eastern half of Minnesota, National Electric has named **Ray Schwabe** of Welding Supply and Specialty Co., of St. Paul, Minn.

Armco Research Center to be Expanded

Armco Steel Corporation has announced plans to double the size of its Research Center at Middletown, Ohio, and push forward with the most extensive product and process research program in its history. Total cost of the building extension and new research equipment will be more than $3,500,000.

* * *

R. L. Gray, Armco president, described the new facilities as "insurance" that Armco will continue to maintain its position of leadership in steel research. He pointed out that Armco was the first company in the steel industry to establish a central research organization. Since the company's first research facilities were built in 1910, its laboratories have introduced scores of new and improved steels and production processes.

Specialty Steel Buyers Guide

A new, 40-page guide for buyers of specialty steels is available from **The Carpenter Steel Co.**, Reading, Pa.

* * *

An excellent reference source, it contains detailed information on tool and die steels; stainless steels; high temperature alloys; electronic; magnetic and electrical alloys; special-purpose alloy steels; tubing and pipe, and fine wire specialties, including needle wire.

The NEW WINDER
FOR
BRAIDER BOBBINS
HIGH SPEED PRECISION WINDING THAT CUTS COSTS WITH INCREASED PRODUCTION AND CONTINUOUS EXACT-CONTROL TENSION; RESULTS IN LESS OPERATORS AND TROUBLE-FREE BRAIDING.
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FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE
Wire Blocks Made To Suit Your Needs
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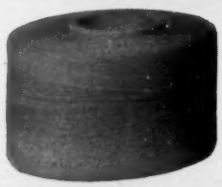
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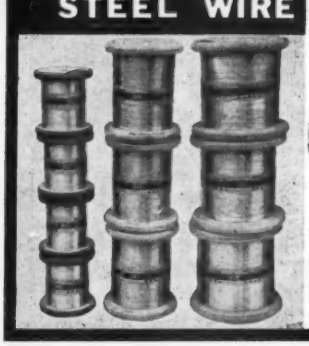

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STAINLESS STEEL WIRE

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Included in the booklet is a tool steel selector chart which provides a system of matching tool steels without resorting to "cut-and-try" methods. Numerous tables show the properties and workability of major types of stainless steel and high temperature alloys.

* * *

For a copy, please write to The Carpenter Steel Co., 3050 West Bern St., Reading, Pa.

Lubricant Developed for Hi-Temp Use

A new lubricant especially formulated for use at high temperatures has been placed on the market by **Acheson Colloids Company**, manufacturers of the 'dag' line of industrial lubricants.

* * *

It is 'dag' 207, a concentrated dispersion of colloidal molybdenum disulfide in an LB series "Ucon" lubricant. Advantages cited are the dispersion's ability to resist settling and to lubricate at temperatures above the point where most petroleum oils carbonate.

* * *

Typical uses are on oven conveyor, kiln car gears and bearings, etc.

* * *

Further information and a trial sample can be obtained by writing Acheson Colloids Company, Port Huron, Mich.

Announces New Stress-Crack Resistant Resin

Development of a new polyethylene cable jacketing resin which is said to set a new standard for resistance to stress-cracking has been announced by **Spencer Chemical Company**, Dwight Bldg., Kansas City 5, Mo. Test samples of the new resin, which is now designated as "Poly-Eth" 3812 (formerly TD 494), have been subjected to all known laboratory tests for environmental stress-cracking without failure.

* * *

The development should be of considerable interest to processors and users of polyethylene jacketed wire and cable since stress-crack resistance is one of the most im-

portant properties required of a jacketing material. The new resin has met the acceptance standards of Western Electric, the largest communication wire and cable producer, Spencer says.

* * *

The new black compound is based on a .918 density material of high molecular weight and is said to combine its stress-crack resistance with excellent processability. **Dr. George Ham,** Spencer's Technical Director, Plastics, said that the resin is produced by a new polymerization process designed specifically to produce a material with superior wire and cable jacketing properties.

Colored Zinc Plating Available for Wire Forms

A new zinc plating process in six basic brilliant colors offers designers a choice of wire/strip components and assemblies that resist corrosion and offer eye appeal.

* * *

According to an announcement by **E. H. Titchener & Co.,** the new process is used in the production of their products and makes available a large choice of colors in any desired degree of density. The lustre-zinc plating first is applied to basic steel wire and then is given a colored chromate treatment and a baked clear lacquer coating for additional protection.

* * *

Titchener officials say that the new color plating process offers designers the opportunity for a new look in custom designed and manufactured wire/strip components in any color for appliance trim, home and gift items, specially designed office equipment, point of purchase display items, and any other application where modern design and outstanding appearance are essential.

* * *

Basic colors available are blue, green, purple, pink, copper, brass, or a blend of any or all for varying shades. For further information on your wire product needs, write E. H. Titchener & Co., 57 Clinton St., Binghamton, N. Y.

Tensolite Acquires Mechtron Labs

As part of a planned expansion program, **Mechtron Labs,** Peek-

WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE WITHOUT WEAR OR DAMAGE

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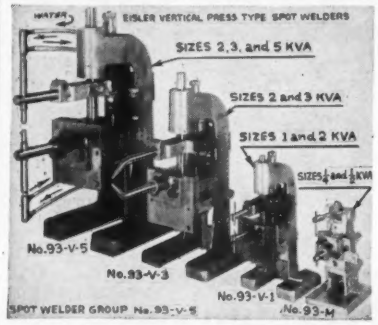

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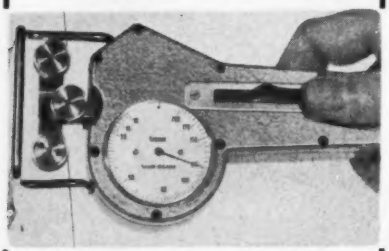

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skill, N. Y., has been consolidated into **Tensolite Insulated Wire Co., Inc.**, of Tarrytown, N. Y., and Los Angeles, Calif. The new unit will be called the Mechtron Division of Tensolite.

* * *

The Division will be responsible for the development, engineering, and production of specialty wire products. The initial undertaking of the Division will be the manufacture of a full line of magnet wire insulated with "Teflon" TFE resin.

* * *

The combined facilities of Mechtron Labs and Tensolite's present magnet wire department will be housed in a separate plant in Peekskill, N. Y., designed to maintain high quality standards by use of a controlled environment found best suited for manufacture of fine gage high temperature wire.

* * *

John Fay, former President of Mechtron Labs, has been appointed Manager of the new Division. Tensolite — a subsidiary of **Carlisle Corporation,** Carlisle, Pa. — is a leading manufacturer of high temperature magnet wire, hook-up wire, cable, and cable assemblies.

New Drawbench for Tubing

A newly built and thoroughly tested 10,000 pound Drawbench is announced by **Lombard Corporation.** Reported to be a radically different concept in drawbenches, it is designed primarily for plug and bar drawing of seamless and welded stainless and alloy steel tubing ¼" to ½" in diameter, but can be used for drawing other standard or special metals or to meet unusual operating conditions.

* * *

The new Drawbench is said to fill a need for economy and versatility in economical machines that heretofore has been lacking. A hydraulic cylinder drive provides maximum operating flexibility at minimum cost and permits easy adjustment of draw and return speeds through a range of 0 to 75 FPM. Pulsations inherent in chain-type drawbenches are eliminated. The operation may be stalled at any point to inspect the product or change draw conditions.

* * *

Lombard designs single, double, and triple draw hydraulic drawbenches operating at speeds up to 150 FPM. Ratings of 5,000 lbs. to 50,000 lbs. drawing lengths up to 40 feet in the smaller size range have the conventional cylinder design. With the use of a piston-type cylinder, drawbenches ranging from 100,000 lbs. to 500,000 lbs., will draw lengths up to 65 feet. Air operated carriages, tilting or rotating mandrel ends for tube drawing, pinch rolls, tube feeders, or tube kickouts, are available features.

* * *

For further information, write the Lombard Corp., 639 Wick Ave., Youngstown 1, Ohio.

Film Made of "Teflon" Added to Du Pont Line

"Teflon" FEP-fluorocarbon film will be commercially available for the first time late this year.

* * *

Like Du Pont's "Mylar" polyester film, "Teflon" FEP film has

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properties of major importance to the electrical and electronic industries.

* * *

The new film is made from FEP resin, which shares practically all of the desirable properties of the older "Teflon" TFE resin but has melt-flow properties that permit its extrusion into uniform, pinhole-free films in gauges ranging from one-half mil to 40 mils.

* * *

Other films in the Du Pont line, broadest and most complete range of industrial films offered by any manufacturer, include polyethylene, cellophane, and acetate.

Coaxial Cable Engineering Data

A complete engineering data and coaxial cable selection chart is now available from **Times Wire and Cable Co., Inc.**, Wallingford, Conn., upon request.

* * *

The 16-page book published by the engineering department contains complete information on selection of correct coaxial cable for various electrical and physical requirements. All types of dielectric and jacketing materials are discussed in detail in both text and chart forms. Attenuation, impedance, and capacitance characteristics of various cable constructions are described and tabulated.

* * *

A listing of over 175 Times-manufactured RG/U cable types is highlighted by a quick-finding impedance range indexing. Special coaxial cable types are also described and listed.

A Review of Recent Wire Patents

(*Continued from page 237*)

is disclosed having warp wires characterized by flexibility, corrosion resistance and high resistance to abrasive wear formed of an alloy consisting essentially of from about 1% to 5% manganese, 6% to 11% tin, .2% to .4% phosphorus, and balance copper.

* * *

No. 2,918,103, WIRE CAGE FORMING MACHINE, patented December 22, 1959 by Edward P. Washabaugh, Saginaw, Mich., assignor to American-Marietta Company, Chicago, Ill., a corporation of Illinois.

Wire mesh is shaped to form a cage after withdrawn from a wire mesh coil and flattened.

* * *

No. 2,918,271, TWISTED SPRING ELEMENTS, patented December 22, 1959 by Nelson A. Crites, Columbus, Ohio, assignor, by mesne assignments, to Rockwell-Standard Corporation, Coraopolis, Pa., a corporation of Pennsylvania.

A zigzag spring element is covered in this patent and comprises a composite twisted group of strands, at least one of them being under both greater strain and a greater tension than at least one other of the strands, the group being bent in a zigzag structure.

* * *

No. 2,918,722, ELECTRICAL COMMUNICATION WIRE, patented December 29, 1959 by Herbert Kenmore, Jersey City, N. J., assignor by mesne assignments, to National-Standard Company, Niles, Mich., a corporation of Delaware.

An electrical conductor wire for communication installations is disclosed, comprising a composite wire with a steel core, a pure copper layer of 10 to 100 g. per kilo of the product next to said steel core, and a layer of substantially pure zinc comprising 20 to 150 g. per kilo of the product over the copper coating.

* * *

No. 2,919,014, WIRE FEEDER, patented December 29, 1959 by Curt H. K. Sjobohm, Worcester, Mass.

This is a division of patent application resulting in grant of patent 2,794,477 dated June 4, 1957 for a method and apparatus for making coil springs.

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All sizes from .104" down to .0004" in stock

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New Awards Committee for 1960

Dartrey Lewis, Chief Engineer, Research & Development, **John A. Roebling's Sons Division** of The Colorado Fuel & Iron Corp., Trenton, N.J., who was appointed Chairman of the Awards Committee by the Board of Directors of **The Wire Association** last October, has announced some changes in his committee membership. The committee members now are:

Harold W. Adams, Director
Electrical Conductor Products
Reynolds Metals Company
Richmond 18, Virginia

John W. Campbell
Assistant to the President
Wickwire Brothers, Inc.
Cortland, New York

Ardelle Glaze, President
Fort Wayne Metals, Inc.
3211 MacArthur Drive
Fort Wayne 6, Indiana

Bruce W. Gonser, Technical Director
Battelle Memorial Institute
505 King Avenue
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Karl F. Hellinger
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Rochester Ropes, Inc.
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Rudolph H. Hertzog
Wire Mill Metallurgist
John A. Roebling's Sons Div., CF&I
Trenton 2, New Jersey

Clement C. Lawson,
Plant Facilities Engr.
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

Norman H. Nelson, Asst. Supt.
Rod and Wire Mill Division
Bethlehem Steel Company
Sparrows Point, Maryland

Gordon T. Spare, Res. Proj. Engr.
American Steel & Wire Division
United States Steel Corp.,
Newburg Works
Cleveland 5, Ohio

Marshall V. Yokelson,
Chief Metallurgist
General Cable Corporation
Bayonne, New Jersey

* * *

This committee is charged with the duty of appraising the papers and articles published in 1959 in **Wire and Wire Products,** using the Oxford System, and recommending to the Board those papers that in their opinion should receive the Medal Awards and Certificates of Honorable Mention in the Ferrous and Non-Ferrous Divisions, which latter includes the Electric Wire & Cable Section.

* * *

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For Wire Drawing, Insulating, Enameling and Coil Winding
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checks for $100.00 and $50.00 for the Medal Awards and Certificates of Honorable Mention, respectively. All awards are to be presented at the Annual Dinner, which this year will be on Wednesday evening, November 16, at the LaSalle Hotel in Chicago.

Regional Meeting in June in Los Angeles

The West Coast Regional Meeting of **The Wire Association** is scheduled to be held on Thursday and Friday, June 9 and 10, at the Statler-Hilton Hotel in Los Angeles.

* * *

At this time the Board of Directors will hold its semi-annual Spring meeting, a majority of the members having indicated their willingness and ability to be on hand.

* * *

Earl R. Potter, President of **Industrial Wire Products Corporation,** Chairman of the Program Committee for the Los Angeles meeting and a Director, extends a most cordial invitation to all wire men east of the Rockies to attend —the West Coast people will turn out in force and would welcome the presence of their Eastern industry brothers.

Atlantic Steel Civil Defense Plan Approved

Atlantic Steel Company has the distinction of being the first industrial plant in Atlanta to submit an approved civil defense plan, according to **Elliott Jackson,** metropolitan area civil defense director.

* * *

At an informal meeting held recently, company president **Howard B. Johnson** accepted on behalf of the employees a civil defense flag to signify achievement.

* * *

The company's plan, in the form of a comprehensive manual, includes all phases of planning for an emergency, from the broad aspects of management problems to the detailed shut-down of each department.

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FOR
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WIRE AND WIRE PRODUCTS

WANTED

EXPERIENCED WIRE AND CABLE ENGINEER familiar with all types of electric wire and cable manufacturing equipment. Some sales ability desirable but not essential. Terrific opportunity in five figure income for consulting and installation services. Must relocate West Coast. Send complete background first letter to Box No. 1016.

WIRE & WIRE PRODUCTS

453 Main St. Stamford, Conn.

FOR SALE

1 Rebuilt Scott Model Q Tester
Dual Cap. 0-1000 & 0-2000
Wedge Wire Clamps
Motor Driven by HP 550 volt motor

1 Rebuilt Scott Model L-6 Tester Dual Capacity
Either A-5 Clamps with 1", 2" & 3" interchanging front surface for cloth duck tape or webbing or C-1 Clamps for rubber or rubberlike materials
With Recorder and with Multiple Speed Drive
Motor Driven

STANDARD MILL SUPPLY CO.
31 Esten Avenue Pawtucket, R. I.
Phone PA 3-1534

WANTED

A Continuous Wire Drawing Machine
8 passes on 16 to 23 gage.
Reply to Box 1011
WIRE AND WIRE PRODUCTS

Metallurgical Engineer under 30 years of age who has completed military service to take charge of research program for development of hot-dip nonferrous coatings on steel wire. Opportunity for advancement into a general research program with a long-established and progressive organization. Send complete and detailed description of qualifications and background.

Reply to Box 1014
WIRE AND WIRE PRODUCTS

FOR SALE

CABLE • HOSE BRAIDERS

6-7" Dia. Horn Gears
4—48 carrier Double Deck Braiders
2—36 carrier Double Deck Braiders
Elec. Stop Motions, 3 H.P. Motors, Without carriers. Reasonable.
ALSO: 16 & 24 carrier Wardwell Braiders, 8 to 64 carrier N. E. Butt Braiders, Fine Wire Spoolers, multi head.

MICHAEL SOLOMON COMPANY
131 Spring Street, New York 12, N. Y.

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ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Molded Fiber Glass Tray Co., Linesville, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

BORAX—Wire Drawing
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

CAPSTANS—for Wire (also Caterpiller Types)
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Larmuth & Bulmer Limited, Manchester, England

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
Apex Alkali Products Co., Phila., Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Homer, N. Y.
Parker Rust Proof Co., Detroit, Michigan
Standard Industrial Compounds Co., Frankfort, Ill.
United States Borax & Chemical Corp., Div. Pacific Coast Borax Co., New York, N. Y.

COLOR CONCENTRATES—For Wire Coatings
Blane Corporation, The, Canton, Mass.

COMPOUNDS—Coppering
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion, for Wire
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.

COMPOUNDS—Metal Finishing
Apex Alkali Products Co., Philadelphia, Pa.
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Phosphate Coating
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Rust Preventing
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Escambia Chemical Corporation, New York, N. Y.
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Rust Removing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
General Tire & Rubber Company, The, Akron, Ohio
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockville, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDERS—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDER RECLAIMING—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Wayne Wire Die Co., Linden, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES DIAMOND—Reversible
Indiana Wire Die Company, Fort Wayne, Indiana
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Central Tool and Machine Co., Bridgeport, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France.
Rusch Wire Die Co., Croton-on-Hudson, N.Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Roll Threading
Rivom, Dijon, France

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Rivom, Dijon, France

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tinning
Roux Wire Die Works, Inc., Oriskany, N. Y.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY)—Draw Benches)

DRIVES—Variable Speed
Allis Co., Louis, Milwaukee, Wisc.

DRUMS—Wire Packaging
Hubbard Spool Company, Div., The American Pulley Co., Garrett, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A. Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.
Harper Electric Furnace Corporation, Buffalo, N. Y.
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Galvanizing Equipment
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen (W. Germany)
Sunbeam Equipment Corporation, Meadville, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Harper Electric Furnace Corporation, Buffalo, N. Y.
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Sunbeam Equipment Corporation, Meadville, Pa.
Wilson Lee Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Resistance Heating, Strand
Harper Electric Furnace Corporation, Buffalo, N. Y.
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Harper Electric Furnace Corporation, Buffalo, N. Y.
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W. Germany)
Sunbeam Equipment Corporation, Meadville, Pa.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS—
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
General Tire & Rubber Company, The, Akron, Ohio
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, Naugatuck, Conn.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINE CONTROLS—Electronic
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Waños Machinery Corp., Hackensack, N. J.

MACHINERY—Blast Cleaning
Wheelabrator Corporation, Mishawaka, Ind.

MACHINERY—Bobbin Winders
Associated American Winding Machinery, Inc., New York, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Larmuth and Bulmer, Limited, Manchester, England

MACHINERY—Bolt, Rivet, Screw, etc.
Boltmaster Co., The, Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Prutton Corporation, Cleveland, Ohio.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Braiding
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, Ohio

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Link Fence
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio

MACHINERY—Chain Making
Larmuth and Bulmer, Limited, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio
Waños Machinery Corp., Hackensack, N. J.

MACHINERY—Closing Cable
Larmuth and Bulmer, Limited, Manchester, England
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N.J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Cold Heading
Boltmaster Co., The, Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Johnson Machinery Co., Newark, N. J.
Morgardshammars Mek Verkstads A. B., Morgardshammar, Sweden
National Mach'y Exch (Used), New York
Showa Machine Works, Ltd., Osaka, Japan
Steel & Wire Machinery Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Maschinenfabrik, Herborn, Germany
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Diameter Control
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Sjogren Tool & Machine Co., Auburn, Mass.
Wayne Wire Die Co., Linden, N. J.

MACHINERY—Draw Benches
American Laubscher Corporation, New York, N. Y.
General Machine Tool Co., Worcester, Mass.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Eccentricity Control (Insulated Wire)
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Edging (See MACHINERY—Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Johnson Machinery Co., Newark, N. J.
Royle, John, & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Wafios Machinery Corp., Hackensask, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Company, Newington, Conn.
General Machine Tool Co., Worcester, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Stanat Manufacturing Co., Inc., Westbury, L. I., N. Y.
Steel Equipment Company, Cleveland, Ohio
Steel & Wire Machinery Co., Cleveland, Ohio
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
National Mach'y Exch. (Used), New York, N. Y.
Nilson Machine Co., A. H., Shelton, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel & Wire Machinery Co., Cleveland, Ohio
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Galvanizing Wire
Orenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Steel & Wire Machinery Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Impregnation Control, Paper Cables
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulation Testing (See MACHINERY—Spark Testing)

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia, Pa.
Cook Mfg. Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
EVG., Machinen & Stahl, A. G., Zurich, Switzerland

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Diam., Insulated Wire
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wisc.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Co., Tiffin, Ohio
National Mach'y Exch. (Used), N.Y., N.Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Packaging Wire
Advanced Wyrepak Co., Inc., Bridgeport, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Patenting Wire
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Pin Making
Nilson Machine Co., A. H., Shelton, Conn.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Plating
Bartell Machine Tool Corp., Rome, N. Y.
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Printing on Electric Wire
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

MACHINERY—Re-Spooling
Associated American Winding Machinery, Inc., New York, N. Y.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Machine Tool Co., Worcester, Mass.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
National Mach'y Exch. (Used), New York, N. Y.
Vaughn Machinery Co., Cuyahoga Fall, Ohio
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Company, Newington, Conn.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So San Francisco, Calif.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Mills
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Special
General Machine Tool Co., Worcester, Mass.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells Company, Frank L., Kenosha, Wisc.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Staple Making
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Straightening & Cutting
American Laubscher Corporation, New York, N. Y.
Johnson Machinery Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson, George C. Machine Co., Cleveland Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Steel & Wire Machinery Co., Cleveland, Ohio
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Bartell Machine Tool Corp., Rome, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Johnson Machinery Co., Newark, N. J.
Krupp, Fried., Machinen-Und Stahlbau Rheinhausen, Germany
Larmuth & Bulmer Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Company, Newington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Tandem Rolling & Edging Mills
Fenn Manufacturing Company, Newington, Conn.

MACHINERY—Take-Up and Pay-Out
Advanced Wyrepak Co., Inc., Bridgeport, Conn.
American Insulating Mach'y Co., Phila., Pa.
Associated American Winding Machinery, Inc., New York, N. Y.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Johnson Machinery Co., Newark, N. J.
Larmuth & Bulmer Limited, Manchester, England
Litzler, C. A., Co., Inc., Cleveland, Ohio
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Thread Rolling
Boltmaster Co., Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Prutton Corporation, Cleveland, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
Cook Manufacturing Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyanoga Falls, Ohio

MACHINERY—Tube Mill, Cold Drawing
Johnson Machinery Co., Newark, N. J.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
Johnson Machinery Co., Newark, N. J.
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Welded Wire Mesh
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Schlatter, Ltd., H. A., Zollikon/Zurich

MACHINERY—Variable Speed Drives
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery—Welding Wire Fabrics)

MACHINERY—Winding Wire
Associated American Winding Machinery, Inc., New York, N. Y.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Machine Tool Co., Worcester, Mass.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York, N. Y.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Company, Newington, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Johnson Machinery Co., Newark, N. J.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammars Mek Verkstads AB, Morgardshammar, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Showa Machine Works Ltd., Osaka, Japan
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Wire and Machinery Co., Cleveland, Ohio
Superior Tool & Machinery Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wire Machinery Inc., Chicago, Ill.

MACHINERY—Wire Preheating
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Wire Rope
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
American Laubscher Corp., New York, N. Y.
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Company, Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio

MOTORS—Electric
Allis Co., Louis, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pan American Trade Development Corp. New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Central Tool and Machine Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAPER—Insulating
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Cary Chemicals, Inc., New Brunswick, N. J.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS—for Wire Insulation
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
Escambia Chemical Corporation, New York, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, Naugatuck, Conn.

PRINTING WHEELS—for Electric Wire
Daniels & Co., Frank, New York, N. Y.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., Inc., West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Mettler Machine Tool, Inc., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Berger Div., Canton, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New York Engineering Corp., Yonkers, N. Y.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
New York Engineering Corp., Yonkers, N. Y.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Molded Fiber Glass Tray Co., Linesville, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Nelson Co., The, Baltimore, Md.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Wood Working Co., Montello, Wisc.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Nelson Co., The, Baltimore, Md.

REFRACTIONS—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Pan American Trade Development Corp. New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

ROLLS—For Flattening Wire
General Machine Tool Co., Worcester, Mass.

ROPE—Wire
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons, Div. Colorado Fuel & Iron Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Removing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Molded Fiber Glass Tray Co., Linesville, Pa.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Div. Colorado Fuel & Iron Corp., Trenton, N. J.

TANKS—Ceramic, for Galvanizing
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, W.-Germany)

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TENSION METERS—for Wire
Boulin Instrument Corporation, Pelham, N. Y.
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
Tensitron, Inc., Harvard, Mass.

TESTERS—INSULATION
(See Testing Equipment—for Dielectric Faults)

TESTING EQUIPMENT — Dielectric Faults in Insulation
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
Peschel Electronics, Inc., Patterson, N. Y.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

TESTING EQUIPMENT — Physical
Scott Testers, Inc., Providence, R. I.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

TRANSMISSIONS—Variable speed (See Adjustible Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WAXES—for Insulated Wire
Cary Chemicals, Inc., New Brunswick, N. J.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Micro Products Co., Chicago, Ill.
Schlatter, Ltd., H. A., Zollikon-Zurich

WHEELS—for Printing on Electric Wire
Daniels & Co., Frank, New York, N. Y.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

WIRE—Aluminum
Malin & Co., The, Cleveland, Ohio
Scovill Mfg Co., Waterbury, Conn.

WIRE—Ball
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Malin & Co., The, Cleveland, Ohio
Scovill Mfg. Co., Waterbury, Conn.

WIRE—Bunched and Stranded
Camden Wire Company, Camden, N. Y.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Copper
Camden Wire Company, Camden, N. Y.
Malin & Co., The, Cleveland, Ohio

WIRE—For Electrical Conductors
Camden Wire Company, Camden, N. Y.

WIRE—Flat
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Jones & Laughlin Steel Corp, Stainless and Strip Div., Detroit, Mich.
Montgomery Co., The, Windsor Locks, Conn.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pan American Trade Development Corp., New York, N. Y.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado, Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Detroit Steel Corporation, Detroit, Mich.
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Marathon Specialty Steels, Inc., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Berger Div., Canton, Ohio
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Metalizing
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Platt Bros & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio

WIRE—Needle
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio

WIRE—Oil Tempered
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio
Pan American Trade Development Corp., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Marathon Specialty Steels, Inc., New York, N. Y.
Pan American Trade Development Corp., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Stainless Steel
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Malin & Co., The, Cleveland, Ohio
Nippon Stainless Steel Wire Mfg. Co., Ltd., Osaka, Japan
Pan American Trade Development Corp., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Malin & Co., The, Cleveland, Ohio
Pan American Trade Development Corp., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Upholstery and Mattress
Pan American Trade Development Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

YARNS—Wire Insulating
Chadwick Yarn Company, Pawtucket, R. I.
Synthetic Thread Co., Bethlehem, Pa.

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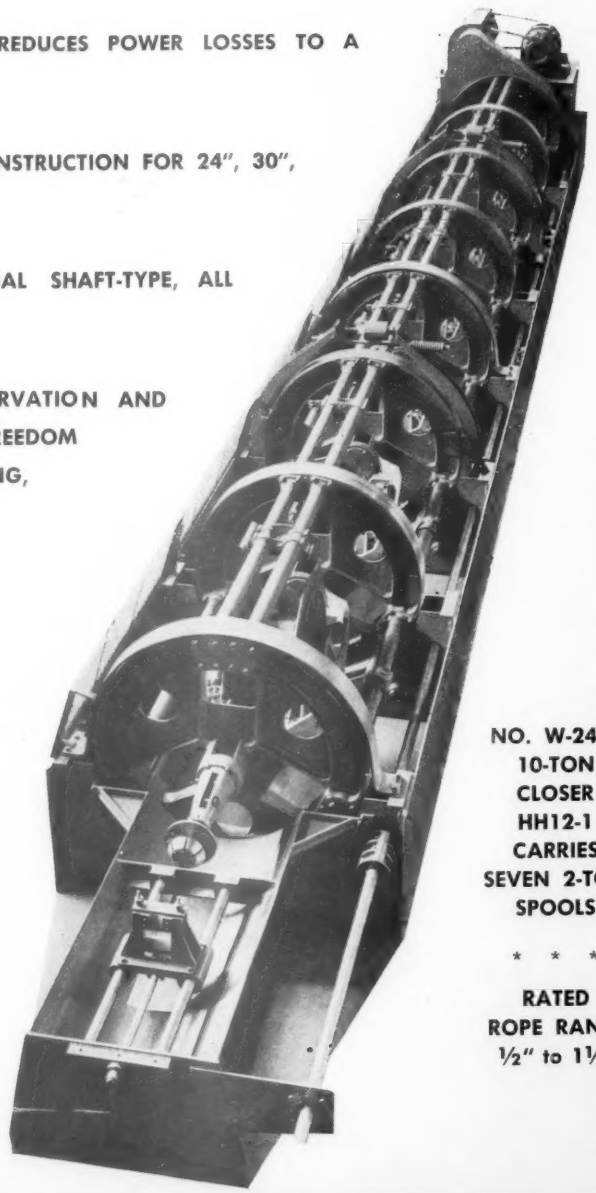

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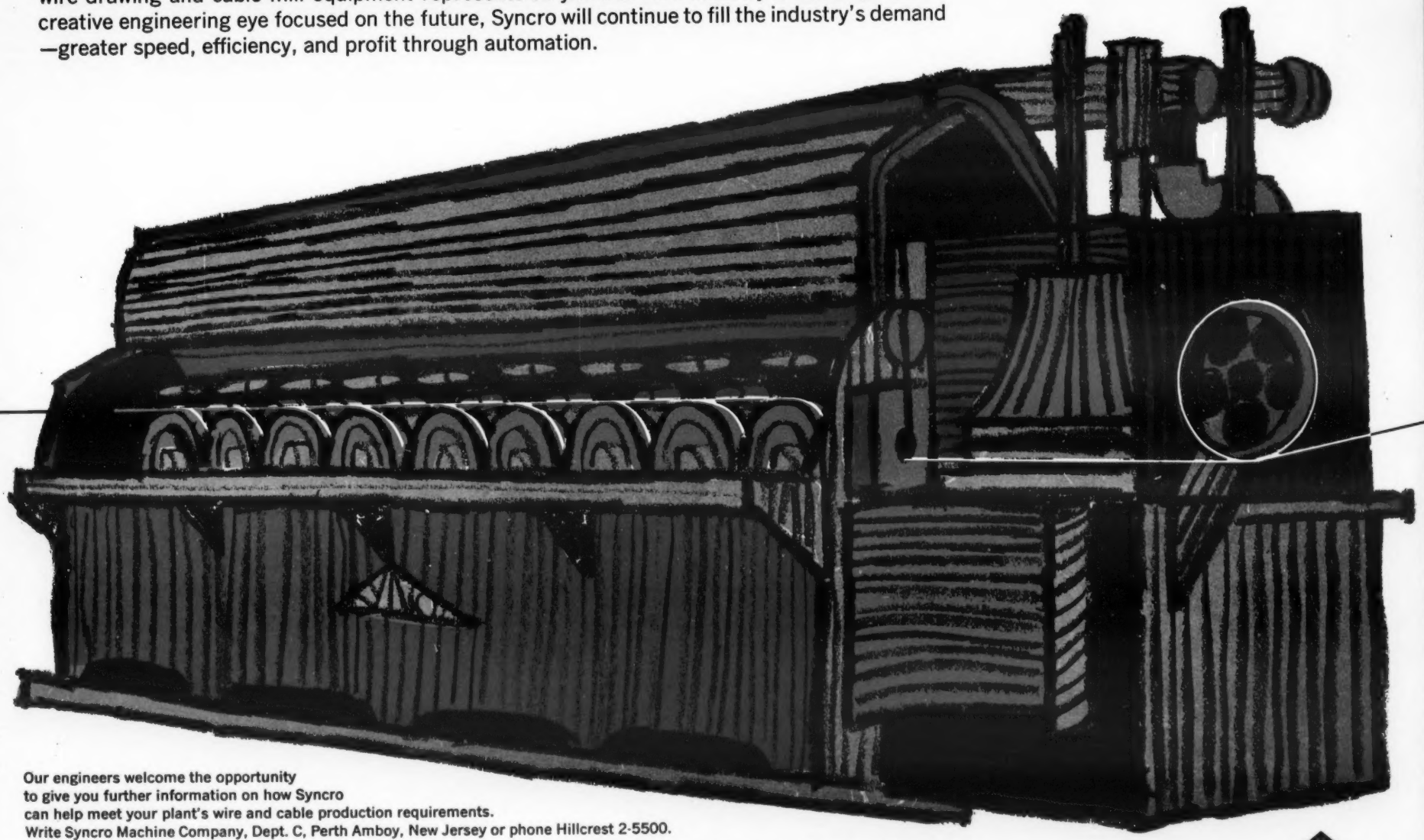

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